modelling ▸ rendering ▸ animation ▸ lighting ▸ characters ▸ architecture ▸ morphing ▸ displacement ▸ shaders ▸ textures ▸ splines

Issue 20 special 1999

computer arts special

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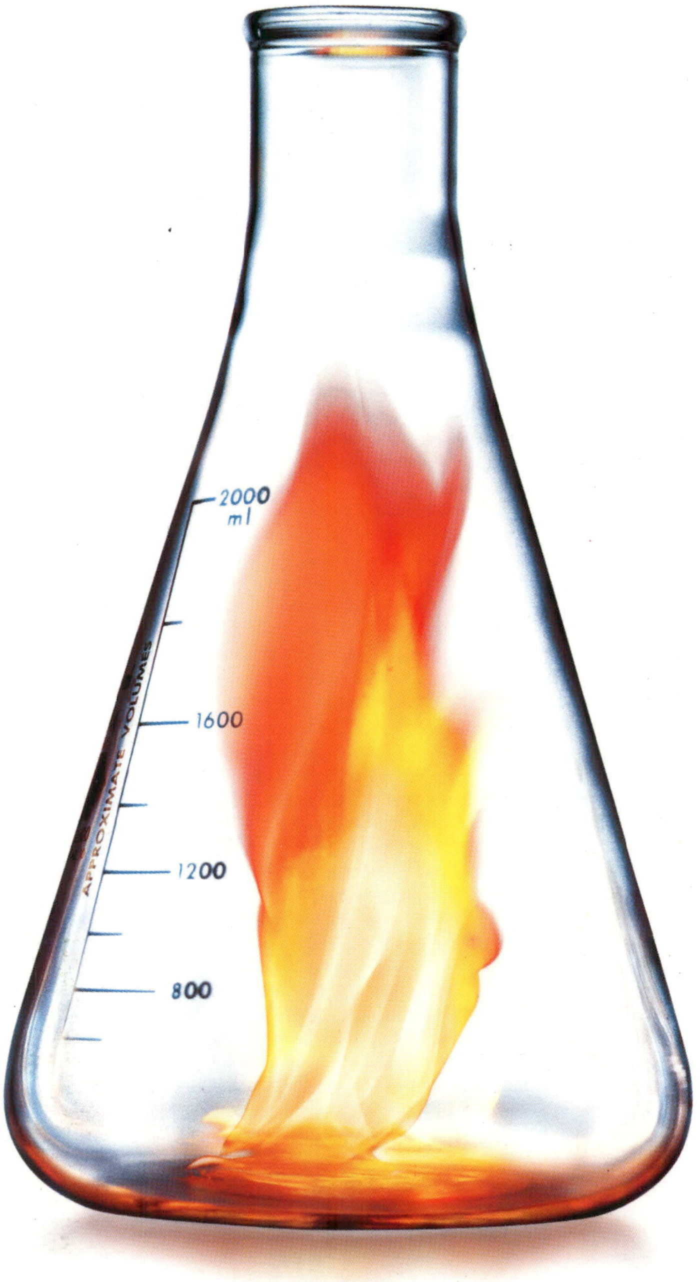

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Welcome to the Computer Arts 3D Special...

...and welcome to 3D! One of the quickest-growing areas of computer creativity, 3D design's 'steep learning curve' reputation goes before it – but the results can be massively rewarding! Everyone wants to know more about 3D modelling, rendering and animation – and the tools and techniques behind it.

Due to demand from *Computer Arts* readers, we've produced 'the Definitive Guide to Mastering 3D'. As ever, the thrust is in showcasing, tutorials and tips – but there's also plenty to learn for novices and professionals alike.

Rather than concentrating too heavily on individual software titles, we've decided to bring you a series of tutorials based on the techniques you can use in most popular packages and across the different disciplines of 3D.

We kick off with basic modelling techniques, followed by a walkthrough on Boolean modelling, a powerful but sometimes tricky technique. We then look at 3D splines, another extremely useful modelling component. Surface displacement is a rather exotic type of modelling that can yield top results, while deforming your models is another handy technique – learn both here.

But building a model is only part of the story; the correct application of texture maps, bump maps, procedural shaders and lighting can really bring an object to life and make it look truly photo-realistic. You'll find technique tutorials on all these as we progress.

Our showcase walkthrough details the creation of a model of Old Trafford football stadium – and you'll also find the newest 3D books reviewed, the best 3D Web resources, plus you can win some superb software. Let's get going!

computer arts special
The definitive guide to mastering 3D • Mac & PC

Illustration: **Mad Frank** @ madfrank@bartucca.dircon.co.uk

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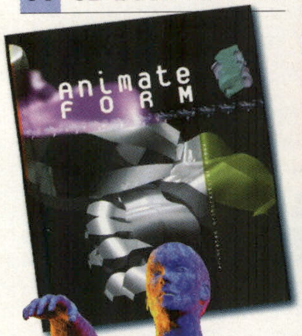

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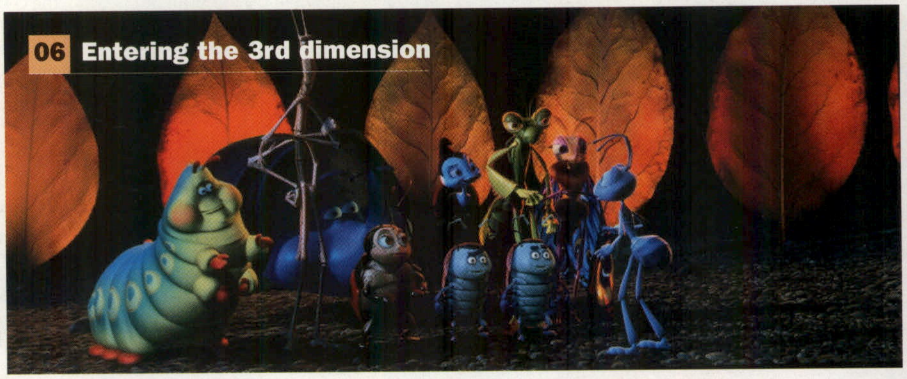

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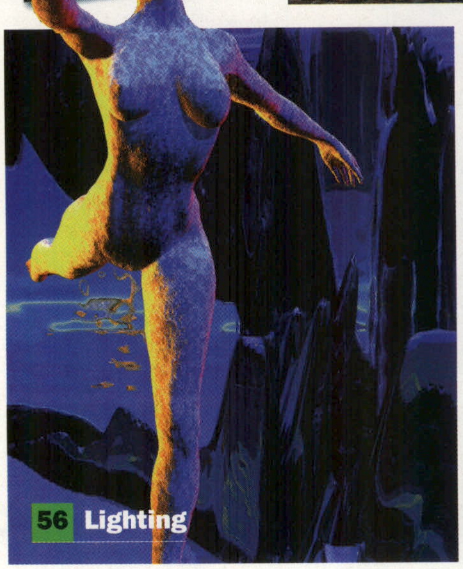

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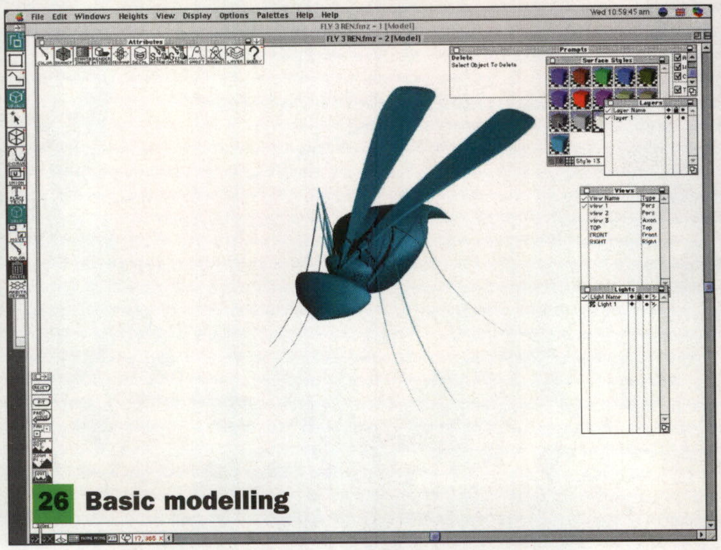

computer arts special
The definitive guide to art, design and technology

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Full free software: *trueSpace 2* (PC only) Strata *Vision3D 4* (Mac only).
Time-limited full software: *Amapi 4* (dual, 60-day), *Cinema 4D GO* (PC, 90-day).
Demo software: *Infini-D 4*, *form•Z 3*, *Painter 3D*, *Bryce 3D*, *Cinema 4D XL*, *Art•lantis 3*, *Ray Dream Studio 5*, *paint**, *effect**, *Photoshop 5*, *CyberMesh* (dual); *Rhino*, *trueSpace 4*, *LifeForms* (PC only); *Onyx Tree*, *3D Dizzy 1.0.4*, *C4D GO* (Mac only).
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Free models: Ten wireframe models from Viewpoint DataLabs.
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Entering the 3rd dimension

SO, WHAT'S 3D ABOUT? HOW DID WE GET HERE? WHAT SOFTWARE IS BEST TO USE? WHAT CAN YOU DO WITH YOUR KIT? AND WHAT'S COMING NEXT? READ ON TO FIND OUT...

Computer technology of any sort has always replaced the conventional type simply by being more efficient, cheaper or faster – and it's no different when it comes to simulating 3D in a 2D medium. Just as *Photoshop* has largely replaced the cumbersome techniques of the darkroom for altering images, we're now used to seeing computer-generated pictures in films and TV – objects that have never truly existed.

To understand how computer-generated 3D effects have managed to make so much of an impact, it's perhaps easiest to look at the film industry. Up until the mid-70s, any film that required 3D special effects – something that couldn't be filmed either because of cost, time, or just because it never existed – would most likely have used scale models, multiple exposures, stop-motion or a mixture of other techniques.

Stop-motion animation was made famous by Ray Harryhausen in a million fantasy flicks – remember *Jason and the Argonauts*? Small-scale models would be hand-built and then animated step-by-step by manually moving each part and exposing a frame or two of film. It was a laborious process and the results were never really that convincing, but it worked – and from the legendary *King Kong* in 1933 right up to *Clash of the Titans* in 1981, this was pretty much standard for character animation.

Filming models as if they were full-sized and compositing the results with other footage often worked up to a point, but usually the visual clues were too obvious to be really convincing. Matte effects involved painting enormous vistas and backdrops on huge sheets of glass and using them as the background upon which the action was composited; but again, this was usually readily noticeable.

Nowadays, it's increasingly rare to find any special effect that involves real sets or objects. The days of model-making and stop-motion are largely gone. Models are now 'made' and 'painted' entirely within a computer's memory, before being rendered and digitally composited with live footage. This is known as computer graphics imagery, or CGI.

What happens next?

A typical 3D package includes a modeller and a renderer. In the modeller, an artist builds an object using lines and curves, in an imaginary 3D space – it might be a simple asteroid or a fully-blown character. When this wireframe (as it's called) is completed, the artist applies texture maps to the object, which add surface detail such as colour, roughness, pattern, shininess and so on.

The last step is to animate the object by moving its individual parts to keyframes, which, as the name indicates, are the most important poses within a movement. The

A short history of CGI

It was George Lucas who changed everything...

Lucas was dabbling with a little film called *Star Wars*, and soon realised that current effects technology was simply not adequate for his plans. So, he began looking into the possibilities of digital techniques. He hired Edwin Catmull of the New York Institute of Technology and formed Lucasfilm's Computer Development Division to research possible computer-aided solutions.

In 1975, Lucas set up his special production unit called Industrial Light & Magic; he wanted, among other things, to develop a non-linear editing system, a laser printer, plus more efficient rendering technology. Thus it came to pass that in 1977, *Star Wars* become the first commercial film to use computer-generated special effects as a production tool – not for the on-screen images themselves, but for electronic motion control of the cameras.

Perhaps more significant – though not in a good way – was *Tron*, released in 1982 by Disney and featuring around 30-minutes of entirely computer generated imagery (CGI). Although the 3D effects were stunning for the time, the film was a commercial and critical flop and effectively turned Hollywood against CGI. In 1984 a film called *The Last Starfighter* featured the most complex computer-generated 3D effects yet produced, but again it made just $7 million and Hollywood remained sceptical.

Undaunted, ILM went on to become the driving force in computer-generated special effects. It developed a multi-purpose 3D renderer called *REYES*, cutting-edge technology that later evolved into *Renderman*. This is now the industry-standard rendering engine used by Pixar in *Toy Story*, *A Bug's Life* and all its other projects.

While a few other 80s films used CGI, including *Return of the Jedi*, *Star Trek II* and *Young Sherlock Holmes*, it was still too unsophisticated to deserve more than a few glimpses of screen time. We had to wait until the 90s for the really good stuff...

© 1999 **Lucasfilm** and **20th Century Fox**

***Star Wars: The Phantom Menace* is released in July, and contains a myriad of special effects. More in *Computer Arts* 32.**

> *"The days of model-making and stop-motion are largely gone. Models are now 'made' and 'painted' entirely in a computer's memory..."*

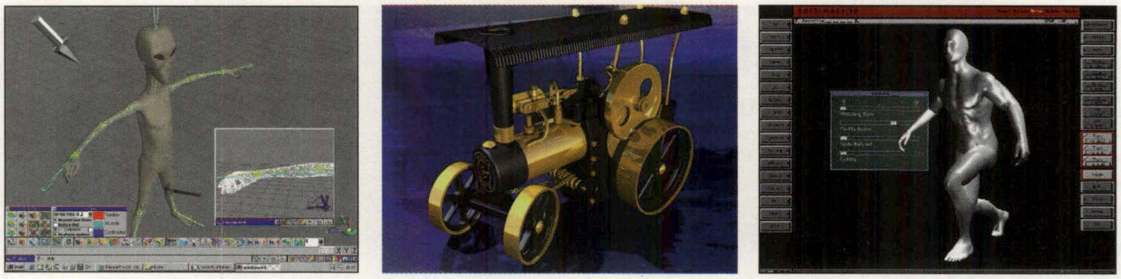
computer itself fills in the missing frames between the keyframes, thus creating smooth movement automatically, and eliminating the tedium of doing every frame yourself.

The whole thing is then rendered: calculated and displayed using photo-realistic techniques that add lighting, shadows, reflections, transparency and so on. Whether you're designing a cathedral, a car or a human being, these basic steps of modelling and rendering remain the same.

Very special effects

Of course, film and TV special effects are by no means the only area in which computer-aided 3D design and animation are now the norm rather than the exception. Architecture, industrial design, game characters and cut-scenes, landscape visualisation, advertising, fine art – all of these disciplines now use 3D software as a matter of routine.

However, it's in film that all the most innovative work is done. In the same way that home computer hardware development is now dictated by the unending demands of entertainment software (rather than business applications), so the most sophisticated 3D work is being done for the silver screen, rather than for a car manufacturer.



***trueSpace* (*left*), *Cinema 4D GO* (*middle*) and *Softimage|3D* (*right*). The latter will set you back over £13,000 – but the full software of *trueSpace 2* is free on the CD, as is a 60-day full trial version of *Cinema 4D GO* (PC). And you can get great results with any of them.**

If you want cutting edge in 3D, look at the film world. Following some disappointing early efforts in the 1980s (see the boxout on page 7), *Terminator 2* began the modern trend in 1991, producing some amazing animations that looked genuinely realistic. More importantly, they were done within budget and on time, by James Cameron's effects company Digital Domain.

Then came the clincher, the film that convinced viewers and filmmakers alike that CGI was here to stay: *Jurassic Park*. Steven Spielberg was disappointed with the initial results of using the time-worn stop-motion technique with full-scale models, and asked leading special effects house Industrial Light & Magic to produce five shots of a stampeding dinosaur herd.

While working on the project, ILM played with a Tyrannosaurus Rex animation "on the side," digitally computing images by referring to a model skeleton. On seeing the results, Spielberg ditched stop-motion altogether and commissioned ILM to do 52 shots instead – the majority of dinosaur action scenes in the film.

***A Bug's Life* (*main pic*) from Pixar, and *Antz* (*inset*) both hit our screens recently, and both are entirely computer-generated movies.**

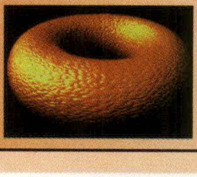
Render fever

It was the level of realism ILM brought to the dinosaurs that wowed everyone. It developed a number of new tools and techniques, including a musculature system to produce authentically rippling skin, plus new shading algorithms for the skin. The bar had been raised, as the Americans say.

Toy Story was the next landmark, the first full-length computer-generated motion picture in history. The company behind it, Pixar, has developed many important technical advances since being founded by ex-ILM employee Edwin Catmull; while director John Lasseter used to work as a Disney animator. Since then we've had *Antz* and *A Bug's Life*, each more technically impressive than the last.

Titanic, as well as being one of the most popular films of all time (and one of the most expensive), also had a huge number of CGI effects. Again, many techniques were new or used successfully for the first time, such as motion-captured 'synthetic people' in

Milestones in 3D Here's how we got to where we are today...

Late 60s	71	72	73	74	75	77
The first advance in 3D computer graphics is made with the creation of the hidden surface algorithm. This can be used to represent 3D objects in 2D space by 'hiding' or not displaying surfaces which can't be seen – a fundamental concept in 3D.	Henri Gouraud presents a method for creating the appearance of a curved surface by interpolating colour across a 3D object's polygons. Gouraud shading is still a standard. First microprocessor also developed.	Lucasfilm founded.	The Special Interest Group on Computer Graphics held its first conference. SIGGRAPH is still the annual industry benchmark showcase.	Edwin Catmull's PhD thesis covers texture mapping, Z-buffering and rendering curved surfaces. Phong Bui-Toung develops a new shading technique that accurately interpolates the colours over a polygonal surface, giving accurate reflective highlights and shading. It came to be known as Phong shading: 3D's other 'standard' shading technique had arrived.	James Blinn develops bump mapping... 	...and then environment mapping.

What hardware?

If you want to get into 3D, here's what you need...

No doubt about it, 3D modelling and rendering software demands a lot from your hardware. The more power you can throw at a 3D package, the more pleasant you'll find it to work with. But not everyone can afford a Silicon Graphics workstation, so what are the minimum specs you're looking at?

Well, for a PC, anything less than a Pentium 200 MMX is just not up to the job. A Pentium II is much more desirable, the faster the better – and if you're fortunate enough to have a Pentium III, all the better...

On a Mac, don't go for less than a PowerPC. Again, a G3 is preferable, and again, it can never be too fast.

The amount of memory – RAM – is just as important as your processor, if not more so. Most 3D packages positively eat up RAM – even with simple scenes. Consider 64Mb a good starting point on both platforms. Later on, as your projects become more complex, you might want to go for 128Mb or 256Mb. It's not unusual for 3D pros to have 768Mb or more in their machines.

Storage space and speed is slightly less worrisome. Most modern computers come with plenty of disk space anyway; 1Gb or so should be fine, unless you're rendering long animations.

Also recommended, but not absolutely necessary, is some sort of 3D accelerator card. On the PC, look for good OpenGL and Direct3D acceleration; on the Mac, you're pretty much stuck with QuickDraw at the moment, though OpenGL is coming very soon, thanks to Apple.

Apple's new G3 looks good & has all the 3D power you need.

> *"A £200 program is often capable of results that equal another costing six times as much – if you know what you're doing..."*

the pull-back view, or the supremely realistic ocean effects.

Fast forward

And now George Lucas is set to do it all again with perhaps the most anticipated film ever, *Star Wars: The Phantom Menace*. This time around, Lucas has access to the most advanced 3D software and hardware technology imaginable, culminating in nearly 2000 digital effects shots. After all, his company almost single-handedly built the CGI industry...

But you don't necessarily need millions of pounds' worth of software and hardware to produce impressive computer 3D. In fact, many films such as *Lost in Space* and *Titanic* actually incorporate effects created with standard desktop PCs and Macs running commercial software.

As usual with 'artistic' software, it's not the value of your package that's important, rather the talent of the person using it. A £200 program is often capable of results that equal another costing six times as much – if you know what you're doing. Equally, a £10,000 package is just as likely to produce god-awful results if it's put in the wrong hands.

The same goes for hardware. Sure, you might have the fastest PC in the world, stuffed with gigabytes of memory – but if you don't know how to make the most of it, you're wasting your time. Adequate hardware is still important, however, so if you're fairly serious about learning 3D, you'll want the best system your budget allows.

When it comes to software, your choice is vast. There are many 3D packages on offer for both the PC and Mac, costing from £150 (*Bryce 3D*), to £13,000 and upwards (*Softimage|3D*). Where to start?

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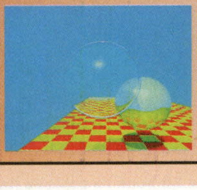
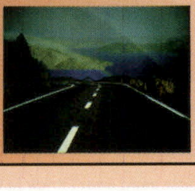
George Lucas forms computer graphics division of Lucasfilm, known as Industrial Light & Magic.

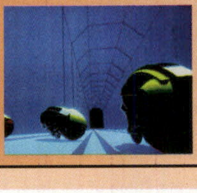
80
Turner Whitted publishes a paper describing the raytracing process.



81
Lucasfilm develops its *REYES* (Renders Everything You Ever Saw) system.



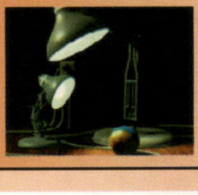
82
The film *Tron* is released. Silicon Graphics is founded.



84
Animation software company Wavefront is founded.

86
Animation software company Softimage is founded.

88
Pixar develops *Renderman* rendering system.



Well, look no further than our CD. We've assembled a collection of demo 3D applications and full programs for both platforms which will give you a taster of how a typical 3D application works. There's also a listing in our Buyer's Guide – page 84.

Doing it yourself

Learning any new 3D package can be daunting, even if you're used to other forms of graphics software. There are a lot of relatively complex ideas to get your head round, not least of which is actually representing and moving 3D objects in 2D space.

Many packages such as *Cinema 4D* (*C4D GO* and a demo of *C4D XL* are on the CD) do this by presenting four views of your virtual scene: three orthographic views – like flat, 2D technical drawings with no perspective – from the top, side and front; and one overall 3D perspective view.

You use the orthographic views to move objects accurately in two dimensions, and the perspective view as a 'camera' on your world. However, other packages such as *trueSpace* (full software on the CD) present you with one large perspective view by default, and everything is done within this. You'll soon discover which you prefer.

While most packages produce the same result – a 3D rendered image or animation – there are many other such foibles to consider. Again, getting stuck in will usually tell you which application suits your own way of working.

Mastering the process of 3D modelling, rendering and animation itself – no matter what the package – is a whole other art, especially if you're a 3D novice. The tutorials and tips in this special will introduce you to all aspects of the process.

Wireframes & texture maps

For example, the first step to any 3D scene is the creation or modelling of the objects within it. There are many, many ways to create a 3D object, and usually no one 'correct' method – so learning all the tricks is beneficial.

We've put together a series of technique-based walkthroughs, which you'll find starting on page 25. They begin with different types of modelling – starting with the basics and including Booleans, Splines and surface displacement. But modelling is only part of the story; correct textures can really bring an object to life, and you'll find an introduction to surface texture mapping and procedural shaders too.

Then there are the more advanced topics, such as lighting (page 56) and morphing for animation (page 66). Finally, you're treated to a showcase walkthrough showing the creation of a model of Old Trafford football stadium, from first vertex to final render.

On top of that there are hundreds of tips, Website resources and wireframe models for you to explore; plus examples of both professional and amateur 3D renderings, book reviews, a software buyer's guide, and full details of the software on the CD.

While the world of computer-generated 3D can sometimes be frustrating and baffling, with the right software and the right knowledge, you'll also find it fascinating, rewarding and downright addictive. We'll give you everything you need to create 3D images and animations; the rest is up to your imagination.

> ***"Mastering the process of 3D modelling, rendering and animation itself – no matter what the package – is a whole other art... Getting stuck in will usually tell you which application suits your own way of working"***

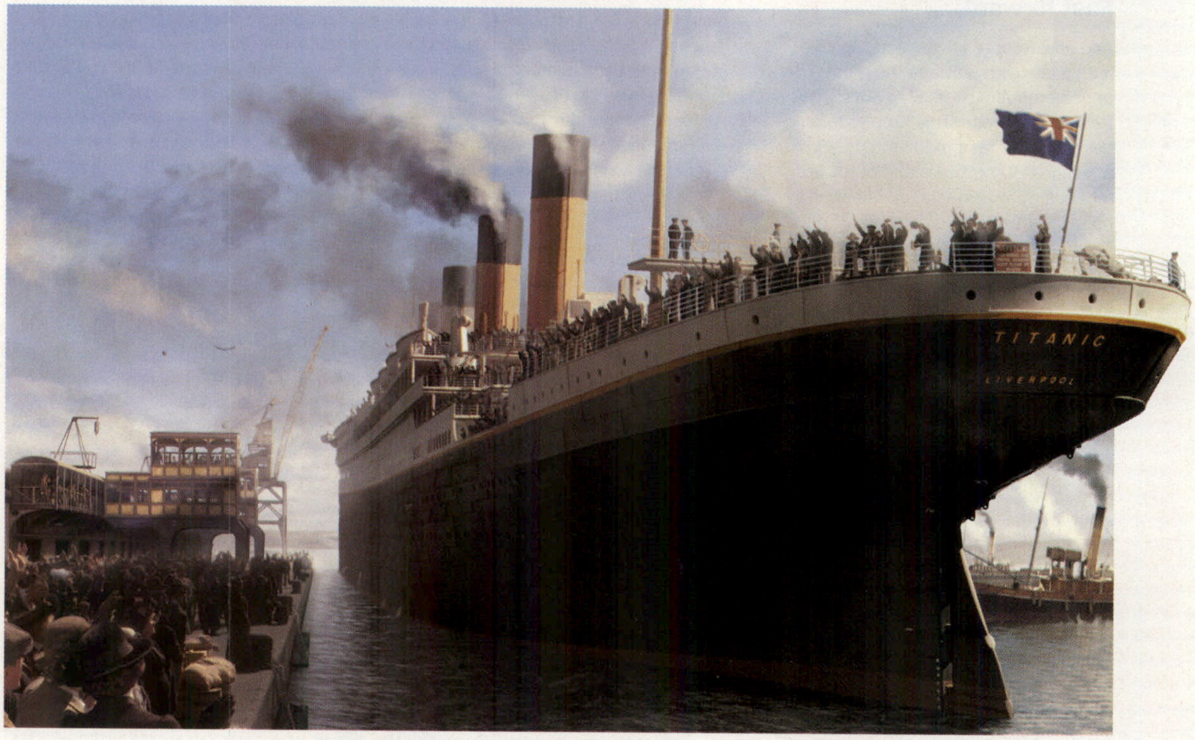


Image courtesy of: **Digital Domain TM Twentieth Century Fox** © 1997 by **Paramount Pictures** and **Twentieth Century Fox**

One of the most famous effects-laden films of all time, *Titanic* used every trick in the 3D book to achieve its stunning success.

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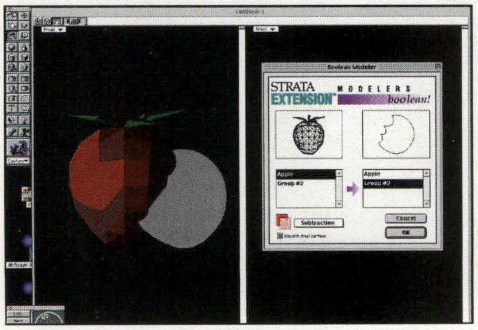
GET TO GRIPS WITH 3D SOFTWARE AND THE WORLD IS YOUR OYSTER. YOU CAN MODEL, ANIMATE AND RENDER, THEN BLOW THINGS UP AT WILL. HERE, WE GIVE YOU A HELPING HAND WITH 200 TOP TIPS, BUT BE WARNED – YOUR LIFE WILL NEVER BE THE SAME AGAIN...

200 3D tips!



A useful feature to get to grips with is Booleans.

Beginners

Sketching

Before you go near your computer try sketching with pen and paper the object you intend building. This will help you understand its form. If possible have the real object in front of you while you are building it in 3D.

3 aspects: modelling, texturing & lighting

Modelling is least important, it just has to reasonably approximate the general shape of the object you want. Texturing is more important. Even a simple model can be transformed if it is textured well. Most important is lighting. Why waste days, weeks or months building and texturing a model only to ruin the scene with poor lighting?

Booleans

Get to grips with Booleans! Most 3D packages now support them and you can model just about anything through a combination of lathe /extrude Boolean.

Lights

As in the real world, lights in 3D are additive. That is a red, green and blue spotlight will create white light where they all overlap on a surface. Try experimenting with different coloured lights to greatly change the 'mood' of your scenes.

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Jargon busters Want to know what all those terms mean? Read on...

Ambient light
This is general lighting that fills a whole scene, without being attributable to direct rays from a particular light source. In the real, physical world, ambient light is a product of light bouncing off surfaces in the environment. Since this usually doesn't happen in 3D rendering packages (see Radiosity), you can generally set an ambient light value directly.

NURBS
What's all that about? Well, this odd-sounding term stands for Non-Uniform Rational B-Splines (and the B stands for Basis, by the way). NURBS are a technique for interactively modelling 3D curves and surfaces using mathematical formulae. This enables much smoother curves and more 'organic' profiles than is possible if you're using polygons.

Attenuation
In the real world, light diminishes over distance at an inverse square rate: objects far from a light source appear darker; objects near a source appear brighter. This effect is known as attenuation. Simple as it sounds, the light sources in some 3D packages don't exhibit this behaviour by default – their light strength is constant, though usually attenuation is an option.

Radiosity
In the real world, light is reflected to varying degrees by the surfaces it bounces off, and is also coloured by those surfaces. You can see this, for example, in a brightly-lit room that has white walls and a red carpet; the lower half of the walls are tinged red by the light bouncing off the carpet. This effect can be simulated in 3D rendering packages using a method called radiosity, which calculates scene lighting much more realistically than normal, and produces stunningly realistic images.

However, most packages don't offer radiosity as an option, since it's extremely time-consuming to calculate and makes the modelling of light sources overly complex.

Orthogonal views
An orthogonal view is a projection of a 3D scene in two dimensions – any two of X, Y and Z – producing a front, side or top view. Unlike a perspective view which alters the apparent scale of an object according to its distance from the viewer, an orthogonal view removes all effects of distance and perspective distortion. This makes them very useful for arranging and aligning objects accurately. Most 3D programs use a few orthogonal views with a perspective view.

Ten top tips for MiniCAD

The steep learning curve of CAD suddenly becomes a gentle incline...

Save Sheet
This is an ultra-useful command which enables you to save different versions/views of the same drawing. So say a GA drawing can also be used as a building reg issue drawing.

Use Symbols
These come into their own when you have an object that appears more than once in a drawing. For example with a seating layout you can use the Edit Symbol function to amend the design of the actual chair, which instantly updates all the seats in the layout.

Class of its own
The Classes function works as a layer within layers. It's really useful when you are copying and pasting between drawings as all the class information is copied, whereas multiple layers all end up as one layer when pasted.

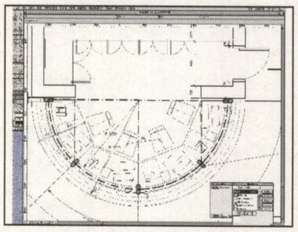
Export
MiniCAD and *AutoCad* still don't communicate too well. MiniCAD talks but *AutoCad* doesn't seem to listen. The new VectorWorks version claims to have improved things but version 7.0 users who need to export to *AutoCad* are well advised to convert all line weights to 1 thickness and turn off text/ dimension layers/ info.

Cheat!
Sometimes it's useful to be able to over write the 'true' dimension as given by the dimension tool. To do this go to the Object Info box, uncheck the Dimension Value button and type in the new value.

Exact paste
Command /alt /v (control/alt/v) pastes drawing elements into the exact same position as they where copied from. Especially useful for elements such as Title blocks.

Vertices
The Object Info box also contains a useful little feature which enables you to add to/ subtract from the number of vertices on any polygon line. Make sure you have the 'move polygon handles' tool selected for it to work.

Use Templates
After you've set up all the units/scales grid spacing etc, use the Save as Stationary command. This will save the drawing as a template from which you can work for subsequent drawings of the same scale.



***MiniCAD* can be daunting – these will help get you up to speed.**

Pick up attributes
This useful little tool not only picks up line thickness and colour but also any hatching within! Great for quick changes to a drawing.

3 best VectorWorks tips
Multiple Undo/ Multiple RedoUndo your most recent action or a number of recent actions and then redo them to take you back to where you started.

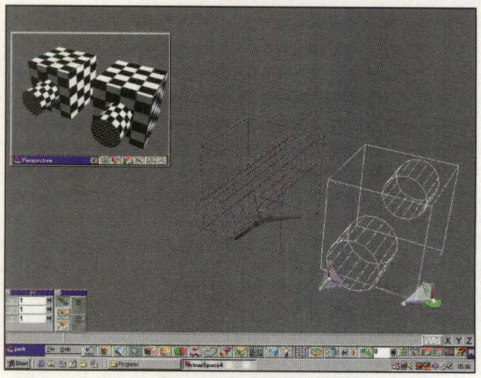
Pick Up mode "picks up" any symbol already in the drawing and makes it the active symbol.

Making walls from Polygons: Simply block out your space using polygons and – usefully – *VectorWorks* will automatically create walls that follow the outline of your design.

⇒ **Shadows**
Unlike lights in the physical world, 3D lights can be set so that they do not cast any shadow. Used in this way they can act as 'fill' lights which will give better definition to a form. (Objects can also be set to cast shadows or not.)

Alpha Channel
Often your 3D object will be pasted into another image or movie. Unless you have definite reason not to, always render your final image with an alpha channel. It makes the job of selecting and compositing an object seamlessly in, for example, *Photoshop* much easier.

Meshes
DXF files are notoriously large. If you are exporting a model as a DXF try and enlarge the mesh size as large as possible, ie use a coarse rather than, fine mesh. This will reduce the final DXF file size and also



There's no point in Booleaning objects unless it makes a visible difference. See 'Don't Boolean Objects...'

reduce the possibility of holes.

Log on!
Get on the Net! There are numerous sites and forums offering guidance to the 3D modeller at all levels. Try stopping off at **w** www.3dcafe.com or any of the sites listed on page and directly hotlinked from our CD.

Monitor
Get a large monitor. A 17-inch model is a minimum, 21-inch is better, and – budget permitting – one of each is ideal!

RAM it up
Put as much RAM in your machine as it will allow or you can afford.

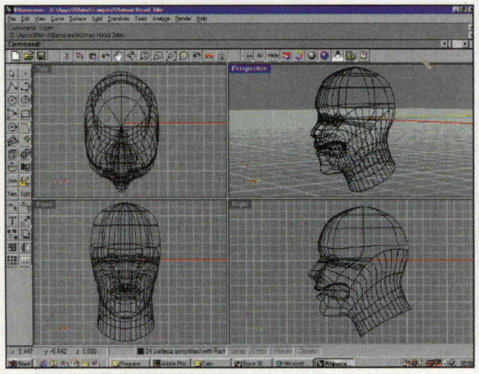
Modelling tips

Making a convincing model of a real or imaginary object is a very satisfying pastime. The key objective is to balance accuracy against complexity, as you don't want to make objects you can't render or animate. Always design your models with their ultimate purpose in mind – if you're going to animate an object, make it simple enough to work with. Once the animation phase is complete, you can always enhance it and re-render.

Don't Boolean objects for the sake of it
If two objects overlap in the modeller, don't Boolean them into a new entity unless they're transparent. By doing this, you'll increase the facet and vertex lists for no visible advantage, as they'll look the same in the render.

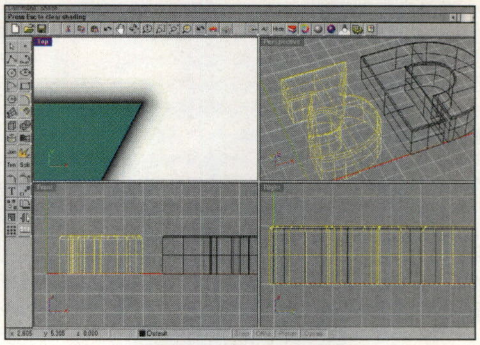
Use Null objects for animation
It's generally a bad plan to make joints that move based on the geometry you can see. If you re-model an object, you may find that it doesn't animate correctly any longer. You should use null objects or invisible cubes for your joints, and attach the visible parts to these.

Use NURBS for curves
Many systems support NURBS surfaces, so use them. Not only do these surfaces avoid the flat 'phong' edges problems linked with smoothed facets, they also create much more realistic natural forms. ⇨



If your modeller supports NURBS, use them! For curves, anyway – it makes a difference, as explained below left.

Many objects are available pre-built free on the Net, so check before you spend ages modelling. See 'Save time'.



Adding bevelling as a final step makes object look more 'real-world'. See 'Bevelling text'.

Ten top tips for 3D Studio MAX

Learn the top tips for this 3D heavyweight...

Get some RAM
With *3DS MAX*, RAM is king – even relatively simple scenes gobble memory. As soon as all the physical RAM is used up, *3DS MAX* starts hitting disk-based virtual memory just like any other Windows program, and rendering will slow to a crawl. A good starting point is 128Mb, rising to 256Mb or 512Mb as you become more adventurous.

Accelerate away
Second to RAM, the next vital element you need is a good 3D accelerator card. This ensures hassle-free use of *3DS MAX*. You'll want one that provides OpenGL acceleration, but check the state and stability of the drivers first – some cards have the hardware but their drivers aren't up to the job. Beware: truly high-end accelerators can cost thousands.

Lighting
Once you add any sort of light to a *MAX* scene, the default lighting – which provides even illumination over the whole area – is turned off automatically. Sometimes, though, you'll need a temporary burst of illumination without fiddling with your carefully-placed lights – in which case the Default Lighting toggle, Control+L, comes in handy.

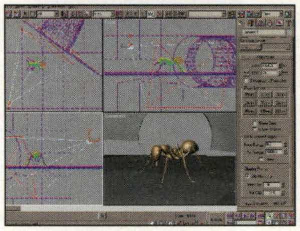
Raytracing
MAX's standard raytracer is fairly slow compared to commercial plug-ins, so the last thing you want to do is slow it down even further. If you're using a Raytrace material or map, go to Global Parameters in the Material Editor and under Ray Depth Control, change the Maximum Depth value from the default of 9. A value of 2 or 3 is more than enough for most scenes, unless they contain huge numbers of reflective/refractive materials.

UV mapping
If you're going to use UV mapping anywhere on an object, ensure you apply some kind of mapping coordinates to the entire object early on in the stack (that is, near the bottom), before you apply any sub-object mapping. Why? Because *MAX* can't create or modify UV mapping on sub-object selections unless the whole object already has mapping coordinates.

Boolean operations
Having problems performing a Boolean in *MAX R2.0*? Try one of these: make sure all the face normals are in the same direction; move one of the operands slightly so no faces or edges are coincident (touching without actually overlapping); and collapse the object to clear the stack between successive Boolean operations.

Camera position
If, when moving the camera very close to an object parts of it start disappearing as if they're being cut away by the camera's lens, then you may need to adjust the position of the camera's far clipping plane. Select the camera, go to the Modify panel, and tick Clip Manually under Clipping Planes. Then set the Far Clip value to some large number like 10,000, and all should be well.

Edit mesh
It's easy to get confused about the similar-sounding Edit Mesh modifier and Editable Mesh objects. Edit Mesh is retained in *MAX 2.x* mainly for compatibility with older versions. Editable Mesh objects, which are created when you collapse an object's stack, provide most of the same functionality and use less memory. However, Edit Mesh is still useful and indeed, it's also necessary in some cases.



Camera clipping can cause problems when it's not set right...

Material Editor
The Material Editor displays maps that use environment coordinates (Cylindrical, Shrink-Wrap or Spherical). However, for speed the rendering method 'fakes' the view vector to be normal to the surface, unlike the main renderer which calculates it accurately. This actually works best when you use sample spheres – so don't use sample cylinders or cubes for environment-mapped materials.

High-res images
You can, if you need to, render images larger than the maximum 10,000x10,000 pixels – high-resolution print images, for example – but only from within Video Post. Add a Scene Event, add an Image Output Event, execute the sequence and you can choose an output size greater than 10,000 pixels. Bear in mind that rendering a 10kx10k image alone (ignoring geometry and so on) needs 800Mb of spare space.

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⇒ Avoid conversions

Unless your favourite modeller fully supports the data types of your render engine (includes NURBS, for example), you should avoid transferring models around between a range of packages. Chances are that you'll degrade the model data in some way.

Get good source material

This might seem obvious, but if you need to model something complex like a steam train, you're going to need good source information to work from. In general, 2D plans exist for designed items of this type, so use a library or the Internet to locate them. And be warned – working from a photograph is very often a diabolical method.

Moulding shapes

If you need to make the hull of a ship or a plane's fuselage, try the following method. Create a cylinder that would encompass the shape, with the top and bottom being at either end of the hull. Make it with 36 sides and 20 segments. Delete half of it and then work along it, distorting each cross-section to the required shape. Finally, mirror the object to create the other side of the hull.

Cheap trees

Landscapes with lots of trees can be something of a rendering nightmare, unless they're just pictures of trees. Take a flat rectangular polygon and apply a tree graphic as a texture. As long as you're not too close (and the polygon is facing the camera), it can be convincing. It's not much use for animation, though.

Use cloning

If your system supports 'cloning', use it in preference to copying. Once an object is cloned you can alter the original object and those changes are replicated to every clone automatically. Unless you intend to change each instance of the original object, where you must use a copy. Great for trees.

Save time

Before you go and spend a long time modelling a minor object for a scene. First, check if you can find an acceptable model from one of the many free sites on the Internet. If it's for a commercial project, you might even consider buying a model. There are some superb free downloads from **w** www.meshmart.org/

Level of detail

Make your models at a detail level suitable for how close you expect to get. Remember – unless you're going to get very close, textures are a much better way to add details than modelling.

Pipes and tubes

The best way to make a pipe or a tube is to use a rail extrusion. You need to make a path representing the centre of the tube. If you want the tube to widen, you'll need another path to define the second rail. You project a circle along the rails. Some systems produce strange results with only one rail, and require the second even if it's only an offset copy of the first.

Bevel for effect

One of best ways to make a model look more realistic

Ten top tips for form•Z

auto•des•sys' leading package struts its stuff...

Layers

When using the Layers palette, remember to hold down Shift when you make visibility changes. This stops the screen re-drawing after each click on the diamonds. This is invaluable with complex models. If you Option-click on the top diamond, you can make all the layers visible.

Wood you believe it?

Make fantastic wood by using the Brick Textured shader. Set the Scale to 100%, Brick Width to 1000%, Brick Height to 10%, Mortar Thickness to 10%, Rough Scale to 500%, and the Rough Amplitude to 5000%. All that's left to do now is pick three 'woody' colours.

C-curves

When creating C-curves, always use the 'Show Points' feature of the Wireframe View options. This helps you keep track of the resolution of the line. Try to keep it as low as possible to describe your curve.

C-curves reprise

When you're creating C-curves, try to use the 'Quick quadratic' curve type, as this produces much more predictable results and works in a similar way to many other popular illustration packages.

Settings

When generating a C-mesh from cross-sections, make sure that the length settings are the same as your original C-curve settings (so they don't change shape). Use one of the Tangent methods of smoothing to be sure the mesh passes through your control lines.

Cross-sections

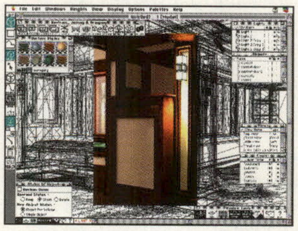
When making cross-sections for a long object, create them along the length and not the width. This makes it much easier to follow the natural contours of the object.

Deform tools

Need to use deform tools on just one side of an object? Make a mirror copy of it first, deform it through the centre and delete the copy.

Importing stuff

When importing objects into *form•Z*, try to get hold of Wavefront 'OBJ' files, as they come in much faster than other formats. If you see nothing after import, try using the 'Import Transformation' setting to scale things up really big.



Use the in-place rendering to quickly preview a scene in *form•Z*.

Fix it up

If you get an 'Object Not Well Formed' error when you're actually sure that it's fine, try exporting just that object – then re-import it using 'Create 3D Solids' and 'Join Adjacent Coplanar Faces'. This often fixes things.

Texture mapping parameters

If you find that textures aren't moving with their objects, make sure you give the surface some texture mapping parameters. Even on procedurals like marble and so on, just activate the texture mapping dialog for the surface and give it some kind of mapping parameter: cubic, flat and so on. This ensures they 'stick'.

Ten top tips for trueSpace

Check out the upgrade options on p97

Glass

Realistic glass is tricky. Don't make it perfectly transparent and use some colour and a little refraction. You also have to use the Metal Shader. Try these settings for Bottle glass:

R251,G247,B255
Metal Shader
Ambient 0.3
Shine 0.88
Rough 0.94
Opacity 0.99
Refract 1.18

Bump maps

Go easy on the bump maps: A subtle amplitude setting achieves a better effect, Try putting the Amp setting at 0.01 - 0.03.

Marble

Exploit the procedural marble texture for special effects. Procedural marble makes great skies, lightning, electrical effects, nebulas, etc.

Candle in the wind

Try this for an animated candle flame; Make a circle (about 10 sides) with the Regular Polygon tool. Quad divide it and texture it completely transparent. Use

Ten top tips for LightWave 3D

Here's some pointers for Newtek's market leader...

Save with extra layer data
To save your model data with layer information intact, hold down Alt/Option and select 'Save As'. On reloading all your objects return to their previous layers. Four-sided polygons can be very useful in the *LightWave* modeller. If you want to make a NURBS object with four-sided polygons, take a cube and sub-divide it. As a rule, four-sided polygons sub-divide into further four-sided polygons.

Four-sided polygons are bad
Divided or sub-divided, if you use it with an object distorted by bones, a four or more sided polygon can present you with a problem. As the polygon gets bent, it becomes non-planar and confuses the *LightWave* renderer. The only solution is to take the object into the modeller and use Triple (Polygon menu). Beware, though: you can have the same problem with displacement maps.

Spare polygons
After a Boolean operation, *LightWave* may have generated two polygons using the same vertex list. To eliminate these, select Polygon>Unify. This can sometimes appear to leave a hole in the object – but don't panic. The polygon left is facing the wrong way. Just flip it to normal to make it reappear.

Tight fitting objects
If objects must fit together like a jigsaw at the end of your animation, you need to do some preparation. Model all of them as one object, in their final position – and only break them up when the model is complete. When you load them into the scene, attach them to a null parent object and move that to where they'll need to be used in the scene. From here, you can move individual parts to make it animate. Trying to load each object and trying to position it will only end in disaster.

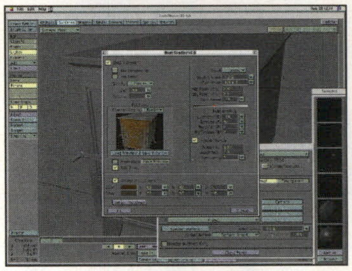
Transparency above 100%
If you set an object to a transparency level of 200% and normal edges, anything viewed through the object has its gamma values doubled. Setting the edges to any other mode reduces the effect back to 100%, but also causes other weird and unwanted effects.

Small glows
Small polygons don't glow very much, because the amount of glow is dependent on the surface area of the polygon. To create a bigger effect, use more particles/polygons, and make sure Glow is enabled in the Effects panel.

Warp drive
Since the original 1980s *Star Trek: The Motion Picture*, the acceleration of a star ship to warp speed has been represented with luminous streaks. To create this effect in *LightWave*, use a string of particles moving towards the camera rapidly, and ensure that Blur Length is set at a long value.

Particle
Blur needs to be set to 'On' too. A nice touch at the end is to place a rapid Lens Flare effect at the vanishing point.

Moving logo lights
If you want light to move around your logo, don't move the lights. Tie every object in the scene (everything other than the lights) to a null object at the centre of the scene, and then rotate the null object. As the camera (along with everything else) is moving, nothing appears to change – other than the light hitting the logo.



Ten top tips to help you tame the beast that is *LightWave* – or at least calm it down a bit.

Some useful keys
In the Modeller, you can zoom to just the selected part of your model by pressing Shift+A. And holding down Alt/Option enables you to scroll around the view port with the left mouse button.

is to bevel the majority of edges. As in the real world, very few edges are as razor sharp as those in a 3D system. Make this the last thing you do, as it increases the vertex and facet list considerably.

Effective tree
To construct a nice tree, make an even-sided cone divided vertically into ten segments. Randomly choose a facet, starting at the tip and extruding away from the trunk to generate limbs.

If you extrude over a number of stages, you can reduce the diameter and also create facets for further sub-division. Finally, triple the number facets for a smoother result.

Hardware may not help
The majority of 3D rendering and modelling systems are not accelerated by 3D graphics hardware. So, unless you use a card which can access OpenGL or Direct 3D, don't bother. If you do use OpenGL, you should understand that accelerating it is a different problem for a game and an application. In short, a

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the Paint Vertices tool, to paint the centre point slightly yellow with about 50% transparency. Grab a few of the upper points on the circle and drag them into a flame shape. Keyframe a few object deforms over about 60 frames ending up at the original shape This will give you have an animated candle flame that you can loop.

Un-triangulation
The triangulation feature in *trueSpace 3* is not undo-able! Here's how to fix it place a plane next to the object – but not touching it – then Boolean subtract the plane from the object. This process converts the object back to its untriangulated original version.

Give us a twirl!
Try this for screws minarets etc.
From the primitives library, select a plane with a resolution of 1.
Scale the X and Y coordinates to 0.5 metres.
Rotate the plane 90 degrees around the X axis.
Left-click on the axes tool, select normalize rotation and then left click on the axes tool Select the lathe tool and right click over it to bring up the lathe properties panel.
Type in these coordinates:
Segments 16, Angle 180, Radius 4, Rotation 0, Helix -.57

Select the lathe tool again to create the sweep. Exit lathe session by selecting the object tool (the white arrow). Rotate the whole scene around the World Y axis until the new face is facing you.

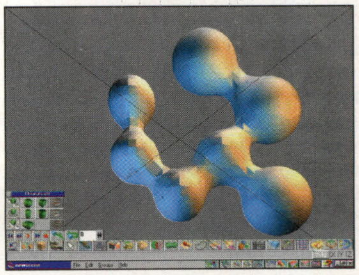
Select the Point Edit: Faces tool and click inside the new face to select it. Repeat the lathing operation 15 times. The second time you select the lathe tool, you'll notice that the rotation of the curve has changed. From now on, you'll have to change the rotation coordinate to 180 degrees. The only other coordinate that will change each time is the Radius. Decrease the radius by .25 each time.

Volumetric Lighting.
trueSpace 2 and *3* don't support volumetric lighting, but it is possible to simulate. First create and set up your spotlights. Then stack about 15-20 planes, each about 0.1 apart, below the lights. Put the following setting on the planes:
R255, G255, B255
Ambient 0.0, Shine 0.0, Rough 0.0
Opacity 0.05, Refract 1.0
Vary the distance between the planes for differing degrees of effect.

Meta-Domino Effect
Altering one Metaball, even slightly, effects a 'mass' of surrounding Metaballs to varying degrees. This effect is often visible when there are Metaballs protruding out the sides of a Metaball body, and is more likely to occur when a large amount of Metaballs are present in a model.

It's a good idea to use the axis reposition tool if necessary so the Metaball primitives don't move as they rotate. The Effect seems to have worse results when using the rounded cylinder Metaball primitive or where several Metaball primitives overlap.

Eye socket
To cut an eye socket into a face, use a Metaball with the negative volume of influence which is roughly half to a third of the size of the Metaball which you are cutting into. If the Metaballs are the same size you'll just get the appearance of a Metaball with a portion missing or sliced away. To get rid of artifacts around the edges of your eye socket, try increasing the render resolution.



Use the in-place rendering to quickly preview a scene in *form•Z*.

Met-a-complet
If you do not need to edit your Metaball model or animate it once complete, it's a good idea to convert the model to a polyhedron before rendering. If it's still in Metaball format it will take longer to render. As back-up, however, its worth saving your scene or object with the Metaballs intact in case you do want to alter the Metaballs later.

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card which is wonderful for *Quake 2* might not be very effective with *3D Studio MAX 2.5*. No graphics hardware to our knowledge accelerates rendering.

Designing for VRML

If you're making a scene that's intended for VRML, you need to think about low polygon counts. This means avoiding Boolean operations and reducing polygon and vertex lists if possible. Many programs have a Polygon Reduction tool which is handy for this.

Bevelling text

A common mistake when working with logos is to take the outline of some text, extrude it into a solid and then bevel the front surface. This is a bad plan because the bevel alters the shape of the letters on the front face, making narrow sections very thin. What you should do is extrude with scale to produce the bevel, leaving the original letter form unaffected.

Bevelling more text

Even if you use the correct technique, bevelled text can pose problems. If the type style you chose has tight curves or rapid changes of direction, it may need extra work. Do a simple shaded render and look for any blemishes on the surface of the bevel. A closer inspection may find intersecting polygons that may need altering to give a clean result.

X,Y & Z and other directions

If you keep forgetting which way is 'up' in a scene, try this. Make a cube and paint a large X, Y and Z on the appropriate sides, adding a little + and – to highlight the directions. Load this object into your scene and place it in view. This makes it obvious which numbers you need to alter to reposition an object numerically.

Helper objects

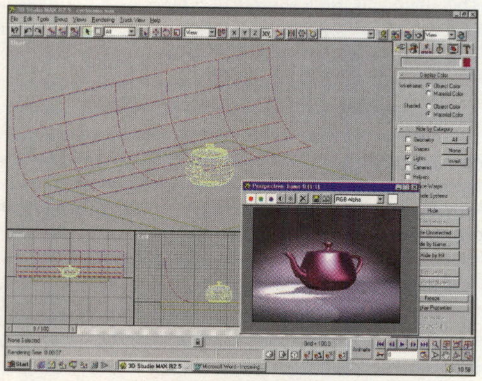
While constructing a complex model, you may find that extra 'helper' objects speed up your modelling. If you make an arch and want to keep referring to the centre of the arc, place a single point or corner of a cube there. Once you've animated everything that needs to use that point, you can ditch the object or place it on an invisible layer.

Use colour

In most systems, it's possible to control the colour of each object when shown in wireframe mode. If you develop a set of rules where you colour objects according to function, you'll find it invaluable in interpreting the display. For example, make objects that use bones white, static objects blue, temporary objects grey, and so on.

Rendering tips

If you're animating and working with detailed models, this is going to be the most time-intensive part of your project. You need to focus on reducing render times, while retaining image quality and production values. Analyse your requirements and consider what role post-production can play – or if you can break your project down into smaller parts. While working, avoid the temptation to render everything at full resolution and quality on a regular basis. It might be nice to see how you're doing, but it reduces your productivity.



Traditional photography techniques have a lot to offer still-life rendering. Try a cyclorama.

Ten top tips for StudioPro

Strata's powerful modelling and rendering package goes under the spotlight...

RAM it up

StudioPro 2.5 eats RAM like it's going out of fashion. You really want 128Mb or more of RAM to tap the program's true power, especially if you're using the particle system to generate special effects. Turn on virtual memory to reduce the amount of real RAM used.

MIP Mapping

If you're using low-resolution texture maps (screen resolution), turn on MIP Mapping in the Map window. This smooths the texture map during rendering, and reduces the effect of artifacts on the final image. Although it may take slightly longer to render, the results are worth it.

Particle system

StudioPro's particle system is a welcome addition to v2.5, and enables you to do all kinds of groovy stuff. However, it also adds substantially to rendering time and RAM requirement. Ask yourself whether the effect you want wouldn't be better applied in *Photoshop* or *After Effects*.

Bézier meshes

Work with Bézier meshes as much as possible in *StudioPro*. They take less memory and are easier to edit and deform than complex polygon meshes. For quicker redraw and preview rendering, move the Smooth slider in the Object palette down to around 10%. Whack it up to 100% for your final render.

Illustrator

StudioPro deals with files saved out of *Illustrator* far better than files saved in *Illustrator* format from *FreeHand*. If you're importing profiles from an *Illustrator* file, make sure all your objects are filled rather than using a line stroke – *StudioPro* only recognises geometry, and stroke doesn't provide this. It recognises *Illustrator* groups, though.

Network rendering

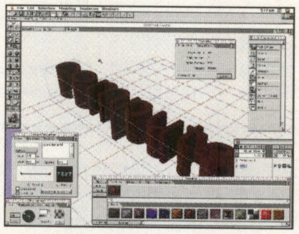
If you have more than one computer, network them together using Ethernet, and install *RenderPro* from the *StudioPro* CD (select Minimum Install under the Custom Install menu, then type RenderPro in the registration number field). This enables network rendering, vastly reducing rendering times. You can do this on as many machines as you like, setting up your very own render farm for animations.

Model hierarchy

Use the model hierarchy. If you plan to use an object multiple times in the same scene, place it in the model hierarchy so it's classed as a shape. When you come to render, each occurrence of it in the main scene is classed as an instance with independence of position and orientation. This means the image renders much faster than if you just model and duplicate the shape in the main window.

Lighting and textures

Good lighting and textures are what make a breathtaking scene, not complex modelling. *StudioPro* has a very powerful rendering engine which supports bump, transparency, glow, and diffuse maps among others. Use these in preference to modelling detail – it'll render much faster.



Modelling is all very well, but lights and textures count for more.

Options open

Wherever possible, use the Anti-matter checkbox next to Objects in the Project window instead of the Boolean operands in the Extensions palette. This means the Boolean operation is done on-the-fly by the rendering engine (rather than changing the geometry). You can then also go back and tweak positioning to objects, and have the renderer apply a different texture to the area being cut out.

Radiosity

If you need to use the Radiosity renderer for diffuse inter-object reflection, it's best to keep the light sources and glowing objects in your scene to an absolute minimum (otherwise it takes an age to render). In complex scenes, you may find it better to render groups of objects on their own with an alpha channel, and then composite them in *Photoshop*. The background rarely needs to be rendered using Radiosity.

Ten top tips for Cinema 4D

Maxon Computer's flagship program sets sail...

Background information
To make a background picture visible in the Editor, first open the Preferences dialog. Then go to the Window page and activate the option 'Display Background Picture In Editor'. Second, create an environment from the menu 'Objects/Special Objects'. Then choose the desired picture on the Back Layer page.

Full fonts (Mac only)
At present, *Cinema 4D* uses all system-specific fonts (which are TrueType). In our experience on the Mac PostScript, Type 1 fonts are mostly used. To use them with *Cinema*, you have two options: first, convert the font into TrueType format (e.g. using Metamorphosis on the Mac) and copy it into your system's Font directory.

Alternatively, you can write the text (in *FreeHand* or *Illustrator*), and convert the letters into paths. Save the file in *Illustrator* format and open it in *C4D*. Keep in mind that holes in letters aren't generated automatically.

True illustration
To import *Illustrator* paths true to scale, try using the following as a rule of thumb: 1 point (for instance, 1/12 of a pica) is similar to one *C4D* unit. With this conversion factor, you can easily set up a formula for the imported spline's size in the Coordinates Manager.

Avoid a flare-up
Cinema 4D has some great Lens Flare effects, but heavy-handed use can cause the rest of an image to be obscured by them. Light sources in the background should have the size of the Lens Flare reduced, so they won't draw too much attention to them.

If you want to simulate shots or photon torpedoes, go for visible light sources. Brighter background lights are obtained by turning on the primary rays and reducing their size to around 8-9 %.

Flickering animation
To avoid 'jitter flicker', render pictures without any dithering. Dithering provides you with missing colours, but also with heavy jittering. Avoid small bump maps (totally if possible), and use either the Mid or Soft filter found in the Render settings.

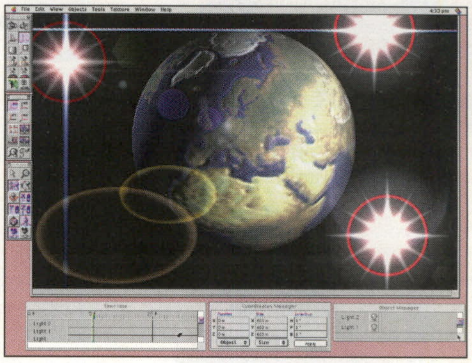
When using noisy textures, switch to interpolation: 'Anti 1' to 'Anti 3'. Use anti-aliasing with higher oversampling. Use higher oversampling and anti-aliasing Colour+Edge, instead of a lower oversampling setting and anti-aliasing Always. If it doesn't disturb your image, use depth of field too.

Wayward animations
If you find that objects are suddenly animated in a different way, it's likely that you animated the scene and then regrouped your animation objects hierarchically. It's very important you first fix the hierarchical structure of the scene and then animate. Everything else leads to unnecessary extra work.

Skipping animations
Frequently, when animating a camera flyaround, the camera is required to point at a 'target' object. As soon as the camera reaches an angle of -90 degrees (relative to the target), the bank angle skips around 180-degrees. This leaves the camera facing the wrong way. To fix this, create a dummy (Objects>Axis) with a pitch of 90-degrees compared to the 'world'.

Now drop your object (the camera) into that dummy. Finally, animate your scene in a way that the dummy does the flying and the camera just the object aligning. No more skipping.

Axis to grind
Cinema 4D has problems with the interpolation between angles. Suppose you want to animate a globe around an axis on a tilt, such as the earth: rotate the earth object around its axis for 360-degrees. You'll notice that if you tilt the rotation axis, you'll no longer have a clean movement. Instead, the sphere 'tumbles'. To fix this, put the sphere into an axis (using the Group function or manually creating an axis and moving the sphere into the hierarchy). Rotate the sphere around its axis, and tilt the parent axis. Relatively speaking, the sphere is still rotating only around its X (or Y or Z) axis, so the animation is correct.

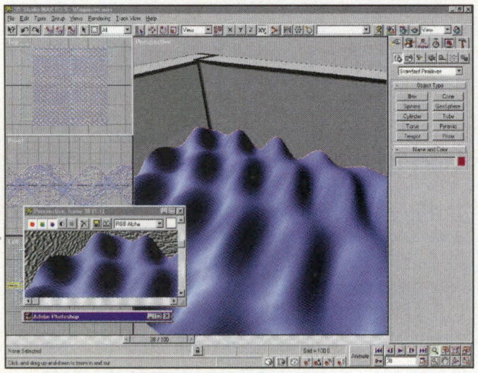


Lens Flares: they're very nice in moderation, but so easy to overdo.

Buggy Booleans
Using plane objects as Boolean operands is apt to produce strange results. (This is because the mathematics of the Boolean operation require the operands to have depth as well as width and height.) When creating a form such as a hemisphere, for example, be sure that the subtraction operand (the object subtracting from the sphere) has volume – a cube slightly larger than the sphere diameter works well.

Holey splines!
Cinema 4D automatically knows it has to create a hole when a closed spline is a sub-object of an other. Create a contour spline and a hole spline, then in the Object Manager, move the hole spline via drag-and-drop into the contour spline. Activate the contour spline and create the desired spline object. Note: two hole splines must not intersect. Hole spline and contour spline must not intersect.

Get parallel
If you have the facilities, then use two computers: one for modelling and the other for rendering. This way, you can carry on working on the models while you test render. This is true 'parallelism', and also offers double performance for rendering purposes.



A bump maps is fine for water effects – except at the edges, where it causes problems. See 'Water problems'.

Coloured lighting
Never make all your lights the same colour. If you have a scene lit through a window, then make the outside light a little yellow, or even orange. The internal filling light (unless you have radiosity) should be slightly blue. Avoid using ambient light, as it flattens everything.

Avoiding coplanar polygons
Most of the render engines fail quite badly if you have coplanar – that is, lying directly on top if each other. There are two ways to combat this: either move them a very small distance apart, or use a Boolean to fuse the design into a single entity. Try moving first, because often the coplanar nature of the problem causes maths problems with the Boolean operation.

Reduce memory overheads
The amount of memory required in rendering can be directly affected by the size of any texture maps you've used. If you can reduce any of your maps in either size or colour range (use 256-colour GIFs not 24-bit TIFFs), then you're going to free memory and speed up rendering.

360 Panoramic Images
Most rendering systems support virtual lenses, that give a dramatic 180-degree result like that from a camera's 'fish eye' lens. To get a full 360-degree panoramic, you just need to stitch two of these images together. If the optical distortion is too great and the images don't connect well, try joining four 90-degree images instead.

Cyclorama
When creating a 'still life' image of a small group of objects, consider using an old photography trick – the cyclorama. This is a curved background that starts under your objects and bends into the vertical. It produces a much less intrusive background than an infinite plane.

Space and light
When creating a space scene, you need to make space a vacuum – and as a vacuum, it must have a refractive index of exactly one. As it has no refraction, you won't be able to use volumetric effects – unless you introduce something with a higher refractive index, like a planetary atmosphere.

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Retox © **Me Company** 1999

⇒ Short focal length effects

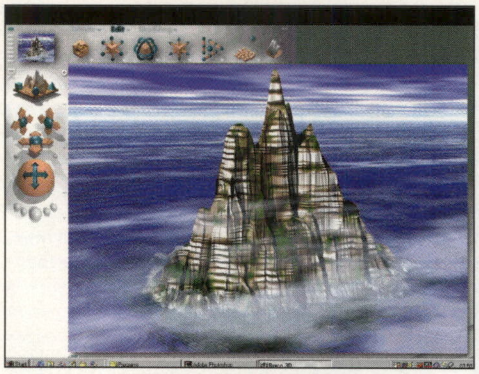
If you have a model of a 'nature' object (like a bird or insect) and want an impressive background, try this: find a background image of a park or floral scene. Place it on a rectangle behind the scene and pull the focal length of the lens down until it goes totally out of focus. This is very effective if the creature is small.

A perfect world

A problem with combining CG and real film footage is that computer graphics is too perfect. One often used trick is to randomly combine one of a dozen 'scratch' frames in post-production. This reduces the image quality enough to make it seem like real film stock.

Water problems

Texture that simulates water is fine up to a point. If the surface it's rendered onto is flat, then this is exactly what sort of edge you get around a boat or harbour wall. This looks very peculiar if the texture suggests the water is choppy. The most practical solution to this is to have the water made from wave distorted meshes.



Water's a tricky blighter to get right, so don't use him unless strictly necessary – so says 'Stay dry'.

Cheat for volumetrics

Before people could render volumetric lights, they used to create the same effect using cones with a high transparency level and a little fractal noise. If the situation is a simple one, this creates the effect and avoids the long render times for real volumetrics.

Keep lights to a minimum

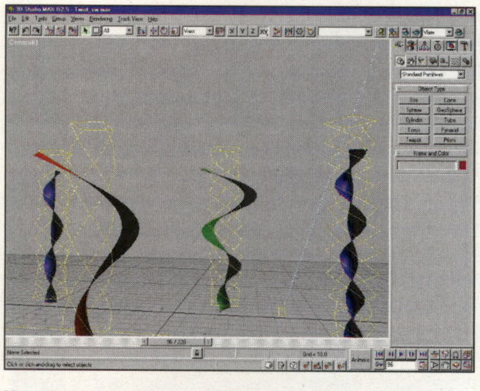
Every light you add increases the render time exponentially for the project. So keep your lights to a minimum, and never have shadows active on a light unless you want shadows from that light.

Sensitive textures

Some textures don't work if the object they cover is anti-aliased. In this situation, you need to turn off the smoothing (either globally, or for that specific object if possible). Another answer to this particular problem is in the next tip.

Quicker smoothing

When you've rendered for a while, you realise that renders that take the longest are those where you set up high quality anti-aliasing. If you're not animating, it can be faster to render the whole design twice at double the size, and get a graphics package such as *Photoshop* to smooth it out when reducing back to the



You want party streamers? They're a piece of cake to create, if you know how. See 'Party streamers'.

Ten top tips for Bryce

Find out what you need to know about MetaCreations' landscape king...

Panoramas

Mac users can convert *Bryce 2* Panoramas into Quick Time VR movies using a free utility at ***w*** http://qtvr.quicktime.apple.com If you've got *Bryce 3D*, you can export QTVR from within the app. If you need to make a panorama from still renders on the PC, you'll need a commercial product called Spin Panorama.

Move the sun and moon

In the new *Bryce 3D 3.1*, it's possible to exactly position the moon or sun. Put *Bryce* in a wireframe mode and select the Sky palette. Holding down Control+Alt (Command+ Option+Control for Mac), double-click on the sun sphere. If you now hold down Control+Alt and click anywhere in the scene, the sun is placed there. If you hold Shift too, it places the moon instead.

Making volumetric landscapes

The default terrain has no volume in *Bryce*, which means that it won't refract light passing through it. To add volume, locate a small triangle in the bottom right of the Terrain Editing screen (it's well hidden, next to the Rainbow icon). The option for Solid is on the pull-down menu it displays.

Negative lights

New to *Bryce 3D 3.1* is the capability to creative negative lights. Like a black hole, they suck light from a scene and their shadows brighten rather than darken. They're useful if you want to make an object less prominent in a dark scene.

Lettering

Don't import lettering as bitmaps into the Terrain Editor, as the results are awful. Use any application that can create lettering in DXF (AutoCAD) format, and then import those objects into *Bryce*.

Use a good modelling program

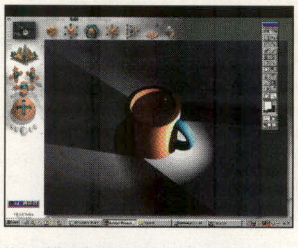
Locate any modelling software that outputs in DXF format, as making elaborate models in *Bryce* is slow and difficult. Objects imported into *Bryce* work well, and you can even use multiple textures if you break it into its component parts. Use *Bryce* for what it's best for – rendering.

Fractal textures (v3 or higher)

Hidden within it the Terrain Editor, this has the capability to make real fractal landscapes. By holding Control/Command+Shift down and clicking on the Fractal button, you evoke a special fractal routine. You'll know it's running because it takes a few seconds to process the image. The results are more worthwhile on high-res terrains.

Space scenes

If you want totally convincing images for space scenes, then get a great background. The best place to find these is ***w*** www.nasa.gov/ Once you have a good Hubble Telescope image of a nebula, turn the atmosphere off and set the background to black. You can then use the picture importer in order to place the image in your scene as a backdrop.



Negative lights actually suck up light, making the scene darker.

Rendering wireframe animations (Bryce 3.1 only)

Animation testing is more about motion than graphics, and so a wireframe test would be fine. You do this by holding Shift and then clicking on the Render button. The animation is then rendered in whatever mode you're currently in (wire or flat-shaded).

Land your objects

New to *Bryce 2* was the ability to 'land objects'. This enables you to drop an object and make it stop when it hits the first object it encounters. This is excellent for placing boulders on a terrain, but remember to embed them into the land a little using 'nudge', or they'll look a little strange.

desired size. This is called 'super sampling', and is a production technique used by the animators who produced graphics for *Babylon 5*.

Super fish eye effect
To produce an impressive fish eye lens effect, use a reflective sphere where the camera was located, turn the camera around and look at it. The entire scene will be seen as if through a lens with a 180-degree field of view. The only snag is that everything is mirrored, which is obvious if you have text displayed.

Animation tips

Professional animators get lots of money for their work, so don't expect it to be easy. Most animation projects fail because they're over ambitious. If you're not experienced, start with something you know you can accomplish and build on that. Starting with multiple characters and synchronised speech is likely to lead to frustration.

Move simple objects
While animating, use either cubes or simplified versions of your models – this speeds up the display and enables you to see the motion more clearly. If your scene is really complex, it might be possible to set up some LOD (level of detail) system, where distant objects have fewer facets.

Layers save time
If you have a static camera and your animation is limited to the foreground, then render all the background to a static image and use it as a background. This might seem a 'cheap' trick, but it was used to speed up production in *Toy Story*.

Limit camera movement
If you're animating a long sequence, be sure to keep the camera still. Note how little the camera moves generally in a film – camera motion is used for 'effect' because long bouts can quickly become disorientating and may cause audience nausea. This is undesirable – unless you want to create a fairground attraction.

Action and re-action
Newton said "every action has an opposite and equal reaction". Good animation takes this and applies it to the hilt. Objects or characters should never come to a complete stop or start moving without some inertial effect being displayed. Energy should never be lost from a scene, but just get redistributed.

Stay dry
Avoid water unless it's specified in your project. Unless extreme measures and time are expended, it rarely looks convincing and detracts from the overall result. If you must have water, consider how you might cloak its limitations with night time reflections, or by using fog and steam effects.

Better water
A mistake often made with water is to make it from a plane. This produces a surface result, but the light coming from underwater won't be refracted correctly. To do water correctly, use an enclosed volume, which will better simulate the effects of depth and refraction.

Exploding objects
If you indent to blow an object apart, then consider breaking it down into independent polygons or even facets. This means the object can come apart rather than just distorting. Yet another explosive trick is to fill the object with a collection of small cone or pyramid objects. When these appear from inside the object, they appear to be broken pieces resulting from the detonation.

Party streamers
If your application supports any sort of displacement field, then party streamers are a breeze. Create a ripple displacement and then simply drop a rectangular patch through it. Make sure you divide up the rectangle into sufficient surfaces so that it looks smooth when bent by the displacement. Slowly rotating the displacement adds an extra twist.

Roller coaster cameras
When we go on coaster rides we don't keep our heads still, which makes for a more interesting effect. To copy this, place an invisible object ahead of the coaster just above the track, and make the camera look to this object. Then, each drop or turn will be anticipated by the camera, which emulates what people do with their heads. This is a useful way to make a hovercraft move, too.

Weird camera effects
A technique that was used in *Jaws* can be re-created

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Ten top tips for Infini-D

Here's how to get the best from this top package...

Set yourself up
Because there are so many different View options, you might find it useful to create a blank scene set up with your own preferred settings (background colour, window sizes, grid plane turned off and so on). Save this as '*Infini-D* template' and keep it on your desktop – whenever you want to start a fresh project, double-click on this instead of the program icon.

Cataloguing textures
If you're creating a lot of textures, add a space at the start of the name. That way they always sit at the top of the list and you don't have to keep scrolling down to find them. Alternatively, typing a letter takes you to the first texture name starting with that letter – or the nearest one – alphabetically.

Built-in procedurals
A quick and easy way to generate highlight and transparency maps is by using the built-in procedurals. Make a black-and-white procedural texture using the Marble, Noise, Wood, Fractal or Corrosion filters, then import this procedural into your surface composition as you would a bitmap. (The Marble effect is great for creating cloud layers on planes or spheres.)

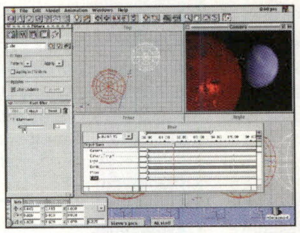
Complex modelling
If you're constructing a complex model with multiple parts using the same texture, first set up a parent, texture it, and then make each part a child of that parent. Click on the 'Use Parent's Surface' checkbox in the Textures menu for each one. Then, should you need to make global changes, all you have to do is alter the parent's texture, and all the children are altered accordingly with a single mouse click. (Note: the 'parent' can be a simple cube buried out of sight somewhere within the model).

Custom-shaped particles
It's not documented, but you can create custom-shaped particles – within reason. You need to create a composed surface using a small alpha channel bitmap, with an invisible (0% Diffuse Shading, 100% Transparency) surface beneath, using the default Decal Mapping setting. Select Rectangular polygon particles and click on the Applied Surface button. To colour the particles, drag your composed surface over the particle generator. Render the sequence using Phong shading – there you go!

Fake focus
Fake focus pulls and depth-of-field by applying the Fast Blur After Effects filter to an invisible object (such as a small cube). You can then either move the cube through your scene to alter the 'focal point', or manually keyframe the amount of blur set by the *After Effects* plug-in. This avoids rendering separate layers and applying the effect in post-production.

Compositing
Composite directly in *Infini-D* by using a QT background image. For instance: animate the camera moving past a planet and starfield. Save this as a 320x240 QT movie. Now build a spaceship, animate it with the same camera movement using the planet and star footage as a backdrop in the Camera view – instant match-moved composite.

QuickTime movies
By the same token, you can use QT

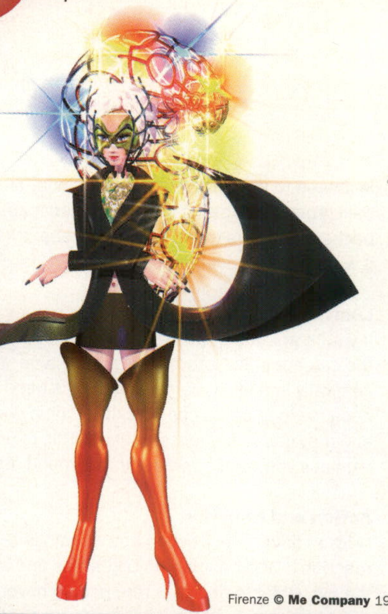


***Infini-D* is great for both still life and animated sequences.**

movies as animated textures to add subtly moving details, produce animated environment maps and to create moving light gels and masks. Also, a simple QT movie of wobbly, interweaving lines can be used as an animated bump map to create the illusion of water on a semi-transparent plane, for example. QuickTime textures and masks are well worth exploring.

Fog effects
Infini-D's fog isn't animatable, but you can create the effect of fog rolling into (or out of) a scene by linking all the models to the camera. By scaling the camera's size over time, the whole scene expands and pushes everything back into the fog – or vice versa. (This works well for huge spaceships appearing out of a white, misty sky, say).

Animation previews
Mac users: when you're animating, did you know that you can Option-click onto the desktop and play your QuickTime animations before they've finished rendering? This is a great way of checking that your animation is working properly and can save hours of wasted rendering time. Now why doesn't *LightWave 3D* enable you to do this?



Firenze © **Me Company** 1999

⇒ using a CGI system to great effect. Place a camera in front of an object or character, then place a couple of cubes to either side of the object so that they're at the edges of the screen. Over three seconds, move the camera much nearer, but at the same time change the camera field of view so you can still see the two guide objects. Remove the guide objects, and record the animation to observe a peculiar effect.

In-camera dissolves

If you want to mix from one animation sequence to another, do it in the rendering process. Render the last second of your animation to single images, with a decrease in gamma black on the last frame. At the frame where the dissolve takes place, make all the objects invisible and use the first frame as a background. Increase the gamma on the new scene objects until it's 100% at the end of the dissolve. Some systems support animated backgrounds, so you don't need to change backgrounds every frame.

Cool colours

If you intend to transfer your animation to video, be very careful about exactly what colours are in your graphics. Many systems support post-production processing for 'safe' PAL or NTSC colours – as both these TV systems have blind spots and will produce black unless fixed. As a rule, avoid strong red colours.

Smooth walking

In a walk cycle, always remember that the foot is in contact with the ground all the time – it doesn't move until the other is firmly planted. Unless you're on ice, or you're Michael Jackson, of course.

More walking

When a character walks a number of things happen, all of which need to be shown to make it convincing. The whole body rises and falls in a wave motion. The torso rotates to swing the arms, and the head counter rotates to remain looking ahead. The feet are always planted closer to the centre-line of the body than in a resting position.

Even more walking

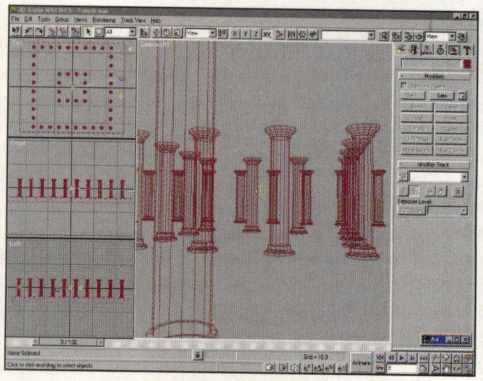
To starting moving in any direction, we transfer body weight forward of our centre of gravity, and then let Newton take over. This should be emulated when working with characters. Always lean the body forwards slightly when moving off, and then back slightly again when coming to a stop.

Count your fingers

Most drawn animation characters only have three fingers and a thumb on each hand. The reason for this is that drawing four fingers on a small character tends make the hand look like a bunch of bananas. This has gone on for so long that it's perfectly acceptable to make 'cartoon' figures that have only three fingers and save some time and effort.

Staging

If you have a character that's going to throw a ball or a punch, you need to signal what comes next. Let the character pull the arm back to an extreme position



Cue depth is a quick and easy way of adding... well, depth to a scene. See 'Cue depth'.

Architectural / lighting

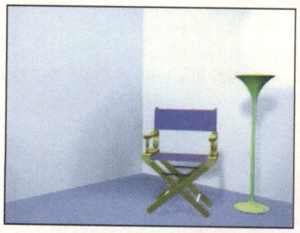
Fancy yourself as an architect? Better get the lighting right then...

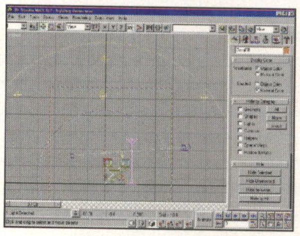
Lighting

In architectural visualisation lighting is everything! It adds atmosphere, it shows style, it sets the mood. It can highlight your textures and hide your mistakes. An overlit scene can look dreadful, while an underlit scene looks like mud. Even if your modelling and texturing is 'par excellence' its the lighting that will make or break your scene – its that simple!

Omni lights

Forget the default ambient lighting set-up. For interiors try using six omni lights placed top/bottom, left/right, /front /back of the room. In *3D Studio* make them 'instances' – it's easier to modify the general amount of fill light. Move the lights around and edit the multiplier values until you are satisfied with the overall ambient lighting.





Visualisations rendered without shadows can look awfully flat...

Darkening

Some packages (notably *Studio MAX/Viz*) enable lights to have a 'negative' value. This is useful for darkening the corners of rooms to realistic effect.

Daylight

For exterior views you are usually attempting to replicate daylight. Radiosity rendering usually give the best result but typically take much longer to render. Raytracing usually gives hard-edged, unrealistic shadows. Experiment with both shadow mapping bias, (*MAX/Viz*) or try using point lights with very large diameters. In *Strata Studio Pro* for example these values seem to work well:
Collected Light amplifier setting: 0.1-0.3
Max diffuse lighting samples to: 4 or 16
Maximum light/shadow samples: 128

Cones

Adjust light cones to match the shape of light fittings. Using non-uniform scaling will allow you to create a more realistic cone shape.

Additives

As in the real world, lights in 3D are additive. That is a red, green and blue spotlight will add up to create white light where they all overlap on a surface. Try experimenting with different coloured lights – this can greatly change the 'mood' of your scenes.

Gobos

Lights can also use 'gobos' to cast interesting shadow effects or project images as slides onto a surface or scene.

Fill lights

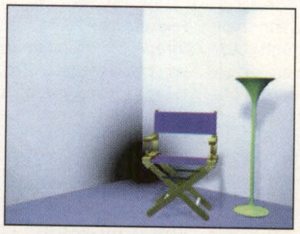
Unlike lights in the physical world, 3D lights can be set so that they do not cast any shadow. Used in this way they can act as 'fill' lights to give better definition to a form. (Objects can also be set to cast shadows or not.)

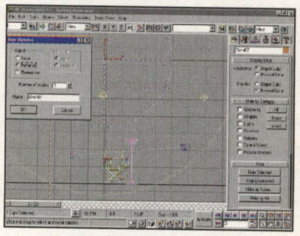
Avoid holes

DXF files are notoriously large (and unreliable). If you are exporting a model as a DXF try and enlarge the mesh size as large as possible, ie. use a coarse rather than, fine mesh. This will reduce both the DXF file size and the possibility of holes.

Convert

Better still, try and use a file conversion utility such as CAD mover, which will enable you to convert most 3D file formats to the one native to your software.





...so avoid over-lighting, and place directional lights with care.

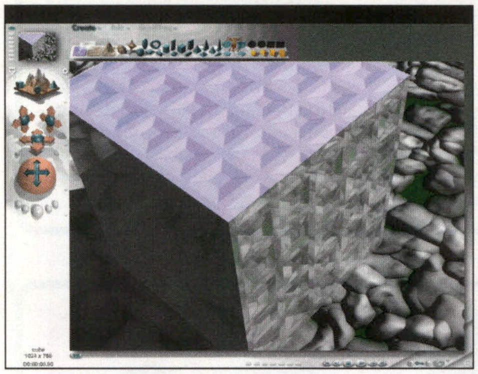
and hold it there for a moment. Then, when the 'punch' is delivered, no-one watching will be surprised by the events that transpire. This is termed 'staging', and exactly how long you wait is a skill all in itself.

Staggering
In animation, energy preservation is exaggerated. An object in motion never comes to a complete stop when travelling rapidly. The best example of this is an arrow fired at a target. When it hits the target, it stops moving forward and vibrates along its length. This time of 'after shock' is known as 'staggering', and demonstrates how the energy is absorbed.

Be safe
Another consideration for producing animation for video or TV is the 'safe zone'. This is an area of the screen that can be seen on any TV when broadcast. Keeping lettering inside the 'Safe Zone' is important if you expect people to be able to read it. Many applications (including *MAX*) display an outline to show you where the zone is.

Frame rate
The frame rate for PAL TV should be designed for either 50 or 25-per-second. If your animation is going to film, then it should be 24-frames-per-second. For either SECAM or NTSC the base rate is 60MHz, so either 30 or 60 will be suitable.

⇒



Bump maps are usually much more efficient than complex geometry – as shown here in *Bryce 3D*, but they do have limitations.

Characters

Traditionally the most difficult job is to model and animate realistic characters

Child's play
If you don't have one then get hold of a video recorder, preferably one which allows slow motion/frame pause. View your favourite cartoon videos in slo mo and then frame by frame. Look at the techniques the animators use to give the character weight and movement.

Paper first
Sketch your character out on paper first – from different angles, and in different poses, and moods. Then try and simplify your design into its 'component' shapes eg. circle for the head, an ellipse for the body etc. Figure out how these pieces join to or relate to one another. It might sound tedious but it should aid the modelling process enormously.

Get 'In character'
Think about what makes him/her different and follow it through. Are they fat, greedy, dumb and slow or thin, sneaky, clever and quick?

Start small
To begin with don't attempt to create a huge story or you will lose sight of the forest for the trees. John Lasseter's *Luxo Jr.* is a great example of a basic exercise done really well. It is a simple stage with two characters interacting.

Don't try to create a piece that stands entirely on its own from head to toe in terms of Modelling, Lighting, textures layout, story, and animation. Go for something that interests you and focus. For example, try three simple shots of simple primitive shaped characters demonstrating different principles of animation, such as weight or follow thru, etc.

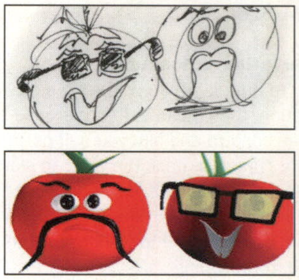
Organic modelling
Modelling 'organic' characters can be tricky. Several programmes (eg. *form•Z*) offer special Metatools which take basic shapes such as spheres and boxes, and coalesce them into an organic resultant, which varies in form depending on the proximity of the objects and the strength of their meta mesh.

Elongated Metaball primitive spheres work well for creature bodies, cylinder Metaball primitives work well for the legs of creatures and animals.

Detail
Pay attention to detail. Look at *A Bug's Life* and the tiny nuances that make each character special (eg. the Lashes on the Ladybug's eyes, Flik's antennae). Think about the material that your character is made of and his size. If the character's not infused with a sense of weight it will look lifeless.

Assymetry
Avoid symmetry when posing a character, ie. don't put the arms in exactly the same position with the same angles and directions. This type of posing will create much more interesting characters and acting. Also, try to vary the direction that the limbs are pointing. For example, both feet will NOT be pointing out from the body at an angle of exactly 45 degrees.

Bones
When creating characters that will be later animated with bones it is best to model the character in a 'neutral pose' prior to building and attaching bone structures to your character. This makes the attaching skin to bones easier and eliminates vertices from different parts of body becoming attached to a limb.



Use a pen and paper to sketch out ideas before committing yourself.

Inverse Kinematics
If you're animating characters, you will need to get to grips with IK. Here is a basic setup: – one two bone chain for leg, end effector at the end of chain (tibia) – two bones for foot, parented to end of leg chain, end effector at toe.

Both tibia and toe effectors are constrained to nulls/ dummies/ goals parented to one null/ dummy/ goal (this set-up not necessary in *MAX 2* – you can just link end effectors without constraints to a 'parent' null/ dummy/ goal). Add an up-vector constraint for knee.

Use props
Props are what give your character CHARACTER! Experiment with different objects – adding a pair of sunglasses to any inanimate object immediately starts to bring it to life. Stick a pair of headphones on a head and your character takes on a different persona.

Want to give lifelike movement to your 3D animated characters?

KINECAPTURE
MOTION CAPTURE PLUG IN FOR 3D STUDIO MAX
FROM PEAK PERFORMANCE TECHNOLOGIES
Video sequence > 3D Model > Rendered Image

Just add motion...

The Motion Capture Company
Tel: 01332 812938 Fax: 01332 812898 www.motioncapture.co.uk

⇒ Aspect ratios

As with frame rate, aspect ratios need to be specific to the target media. Using the correct resolution and aspect ratio for the output will make the most of your hard work. For example, the DVD resolution for movies is 704x576.

Observation/rotoscoping

If you're having difficulty making a character perform an action, then make some reference material. Borrow a video camera and film yourself performing the same action. Then play back the video in slow-motion to observe the details. If you can record the video into the computer, you can even place it behind the animation and use it to work from. This technique is called 'rotoscoping'.

Cue depth

If you want to create real depth in a scene, reduce the focal distance so anything very close or far away is blurred. Place an object in the foreground and move so that it passes in front of the camera. The idea is to create a parallax effect, giving the scene more depth.

Bump mapping limitations

The use of bump maps can add extra detail to a surface, but it has limitations. The 'bumps' aren't actually real, so the surface edge on it is flat. For this reason, you should avoid having bump mapped surfaces inspected too closely.

Beware copyright

If your finished work is going to be shown on TV, in print or on the Internet, then avoid copyright issues. Never be tempted to animate an existing Disney, Warner Brothers or recognisable character, or use a commercial product logo. These people defend their intellectual property with the best lawyers, and you could find yourself slapped for a tidy sum of cash. ca•s

Ten top tips for Rhino

The popularity of this modeller is rapidly gaining momentum...

Customise
This might seem obvious, but customise! The default screen layout for *Rhino* makes for small display panels if you run at 1024 x 768 or lower. If you don't use the icons then remove them, take control of your application and make it how you want it.

Background Image
Use the Background Image facility if you're modelling something organic. If you want to make a Nurb of a human hand try scanning your own hand as a reference image. For trickier surfaces, try using a digital camera to get image data.

Solid Thinking
If you use *Rhino* exclusively for modelling and would like a rendering system that takes *Rhino* files, take a look at *Solid Thinking 3* by Gestel (**w** www.gestel.com). It has a very high performance engine with many fine features including radiosity. Top notch.

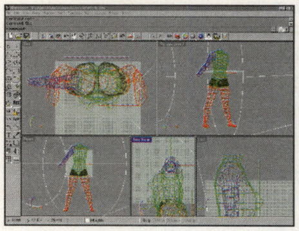
POVray
If you don't want to pay for a render application you should consider *POVray*. The *POVray* application was one of the very first PC raytracing applications and you can download it for zip at **w** www.povray.org The results can be great.

Y-shapes
Making Y-shaped surfaces can be difficult, as you can't work from three different profiles. The solution is to make two objects one for each side of the 'Y' with the centre part duplicated. You can then use BLENDSRF to fuse the pair together.

Command line
Every feature in *Rhino* can be accessed from the command line, if you want to know what is available just enter 'help'. If you find a command, which you use often, and with particular parameters, you can make own icons for these. The *Rhino* documentation explains how to do this.

Speed boost
If you want to speed up *Rhino* you can do two things – get a faster processor and more memory. Forget high performance 3D OpenGL graphics cards, *Rhino* won't use them. A good 2D card and a Pentium 3 is a better investment 'til V.1.1 comes along.

Layers
Use layers on complex models. The layers in *Rhino* are designed to enable you to switch items on and off at will, and globally colour parts of the same material. As the object your designing gets more complicated focus on the relevant parts by using layers.


There's more to *Rhino* than meets the eye. Check out the demo.

Renderman
Rhino users now have a *Renderman* rendering tools from BMRT. Pixar, of *Toy Story* fame developed the *Renderman* technology. The advantage of *Renderman* is its ability to render NURB surfaces without reducing them to facets. *BMRT* is shareware, and you'll find it at **w** www.bmrt.org.

Animation
So *Rhino* is a modelling program and does no animation? At **w** http://penga.simplenet.com/rhino you'll find out about an animation workspace that enables you to animate and render animation from within *Rhino*.

Me Company's Firetrap Girls

The talent behind the characters that grace our cover

The ambitious UK clothing company Firetrap has a unique vision and attitude which it brings to its advertising – and Me Company was happy to keep them one step ahead of the pack. When Firetrap launched a new range of girls' clothing, Me Company was commissioned to direct and execute the campaign. The adverts were completed last year and have been seen in a range of printed media.

"The challenge our client presented us with was how to show the clothes but without using the cliched idea of pictures of models wearing them," explains Me Company's Alistair Beattie. "We wanted to create the idea that these are 'real' characters who have minds and lives of their own. The styling and attitude of the characters follows on from the work that we did for the menswear but brings a new edge and more feminine sense of humour."

Importantly this is the first time that the characters are featured wearing computer generated versions of the clothes. "We created three characters who between them had to epitomise the attitude and personality of the Firetrap brand." continues Beattie... "Retox, the quicksilver courier, Firenze, the sexadelic nightclub promoter and Dexter the armoured kitten are ready to party!"

About Me Company
Me Company is a London-based design company founded 12 years ago. The studio specialises in complex 2D and 3D production techniques working for record labels, advertising agencies and directly with clients. Me Company is well known for its experience in the design, development and animation of modern digital cartoon characters. The list of projects is as varied as the work and includes work for Bjork, Unilever, Fuji, Apple and Sony.

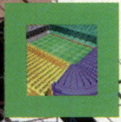
Me Company's work has been featured in print, TV and broadcast video – and they are currently working in areas as diverse as games, books, Websites and product design.

Retox expresses speed, agility and uncompromising determination to get things done. Firenze is self-sufficient, she wears her dreams around her. A no-knickers psychopuss of the first order. Reflex is the girls' security-cat.

Information
*Check the Website at **w** www.mecompany.com for more images and examples of character design – and look out for a new profile in Computer Arts.*

3D techniques

ALL OF THESE 3D TECHNIQUES TUTORIALS ARE DESIGNED SO THAT YOU CAN FOLLOW THEM IN A VARIETY OF SOFTWARE PACKAGES. YOU CAN TRY THEM IN EITHER THE FREE SOFTWARE OR DEMO SOFTWARE PROVIDED ON THE CD, OR HAVE A GO USING YOUR OWN PERSONAL FAVOURITE...



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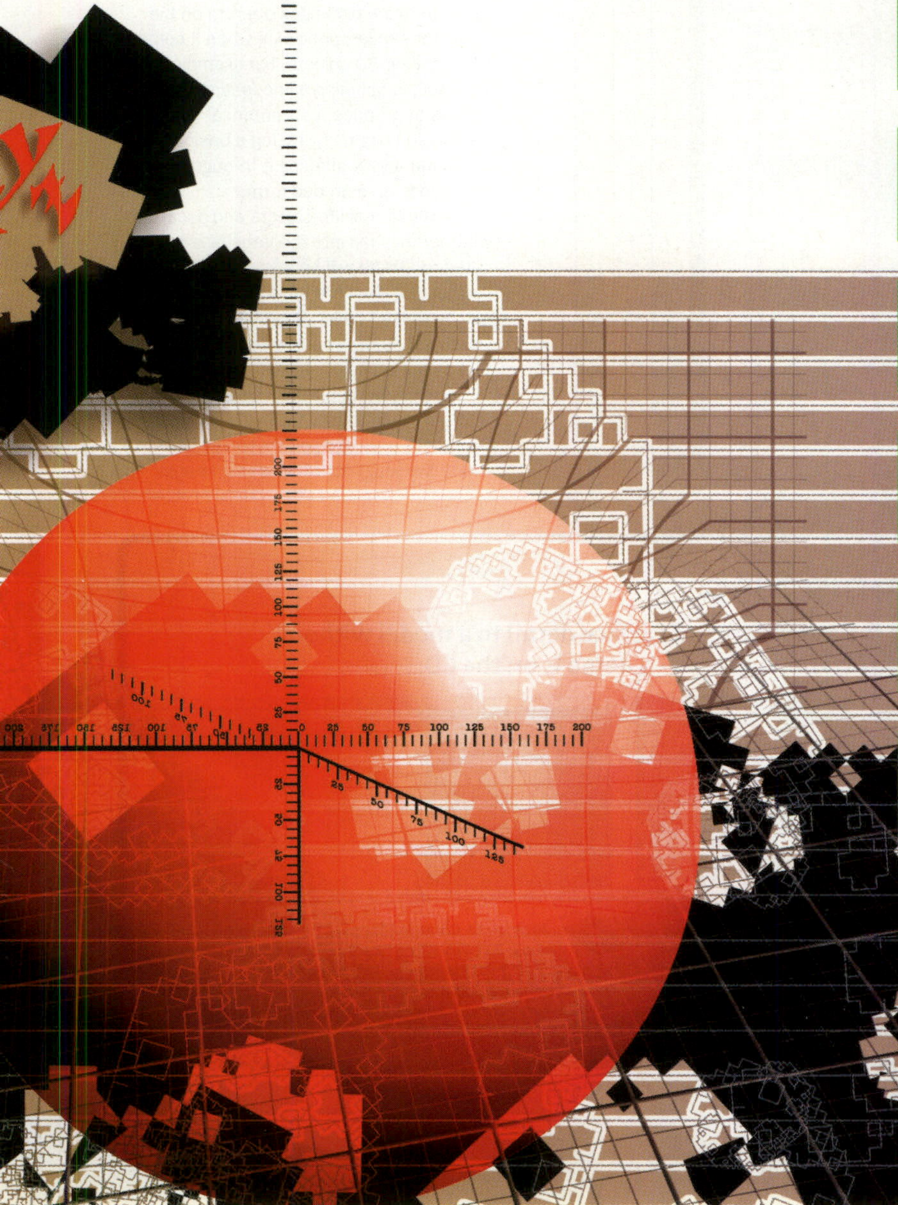
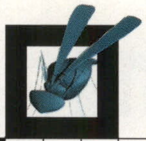
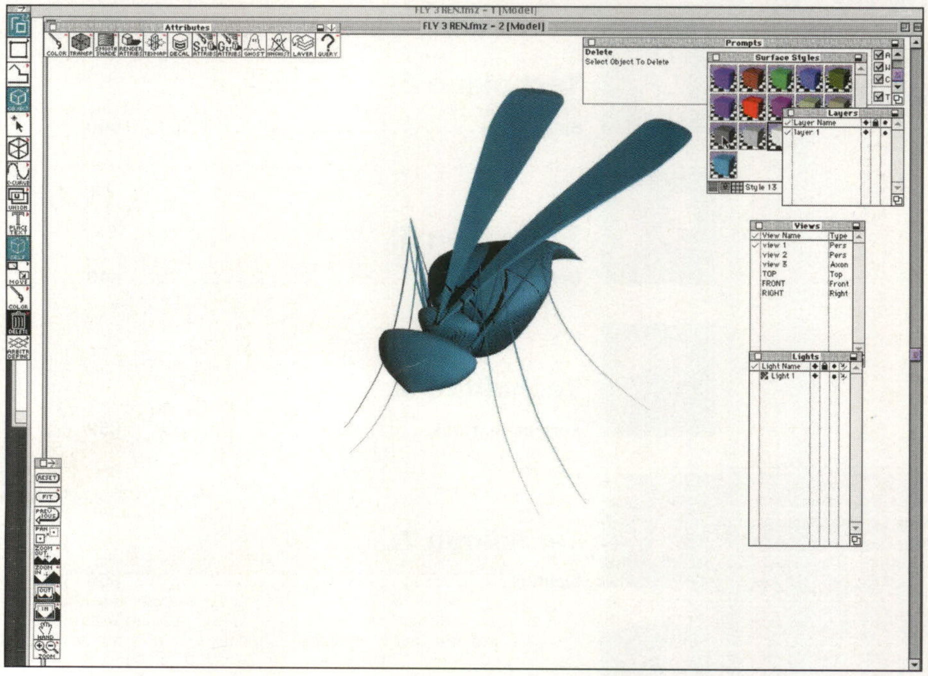




technique one

Getting started

YOU'VE READ THE HISTORY – TIME TO GET YOUR HANDS DIRTY!



Good news – 3D has never been easier! The software is cheaper, more powerful, and more user-friendly than ever, putting even greater creative possibilities on your desktop. What's more, creating 3D graphics is great fun: skilled modellers and artists are in high demand, so you could even have fun and earn your fortune to boot. But before you leap into the third dimension, read on to ensure you're on the right track...

Get your brain wired for 3D

Most software packages operate on the same (or similar) principles when it comes to modelling 3D objects. For example:

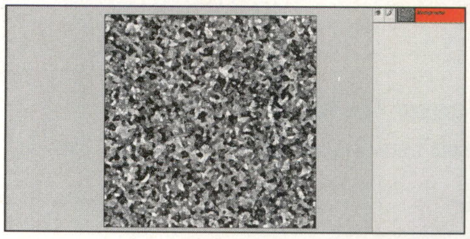
- Lathing is spinning a line/shape around an axis to produce a symmetrical form.
- Extruding begins by taking a basic shape or outline and continuing it through space, to produce an extruded form.

Analyse real-life objects and ascertain whether they fall into the lathe or extrude category. There will be some that are neither, but even the most complex objects can be broken down. Building an object in your mind before you attempt to model it makes the process quicker and easier.

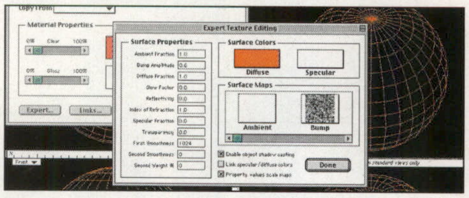
The following tutorials use methods that are applicable to most 3D packages. Give them a try and you'll soon be able to tackle the toughest of 3D assignments.

One: Creating an orange using a bump map

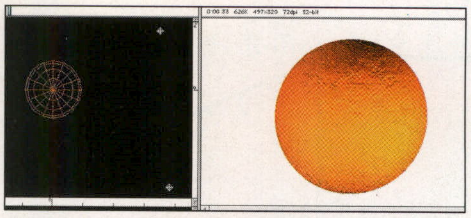
Bump maps are an efficient and time-saving way of adding the appearance of surface detail to a model without actually having to model it. Here, we're using a bump map in Strata *StudioPro* – a demo is on the CD...



1 Create the texture in *Photoshop*. Begin with a greyscale doc (white background, image size of 300x300 pixels). Add noise at a setting of 48, apply Fresco (Artistic filters) set to create a dappled effect. Save as a PICT file called 'Orange peel' or similar.



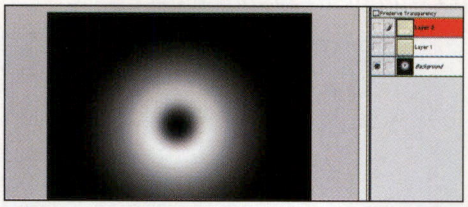
2 Create the orange as a sphere in *StudioPro*. Open the Texture palette, click New and colour it (Colour button & Colour Wheel). Click OK, then the Expert button in the Texture Editing window. Click on Bump in Surface Maps, then Get Picture in the dialog. Select the 'Orange peel' texture, set bump amplitude to 0.6, reflectivity to 0.2 (Surface Properties).



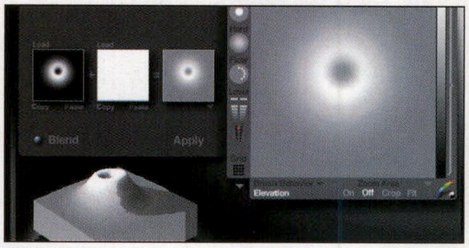
3 Now go to Change Mapping (in the Textures menu). Set the Tiling to Infinite and Mapping to Spherical if it isn't already. Set one of the views to Isometric, select the camera from the toolbar and take a snapshot with the camera setting on at least Better. Et voilá – one juicy Jaffa!

Two: A volcano using displacement mapping

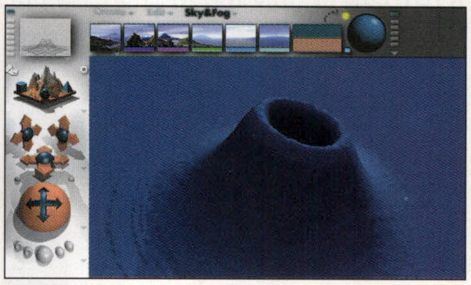
Greyscale images are used by many 3D programs for height info to create terrains. We're using *Bryce 3D* – demo on the CD...



1 Begin with a *Photoshop* doc 1000x1000 pixels. Create a large brush (900 pixels plus). Select the Airbrush & click in the centre of the canvas to create a large white circle which fades to black. Switch the Background/Foreground colours and change the brush diameter to 100. Click the centre of the circle to create a black circle. Add about 7 pixels of Gaussian Blur (Filters menu), save the image as a PICT – 'Volcano'.



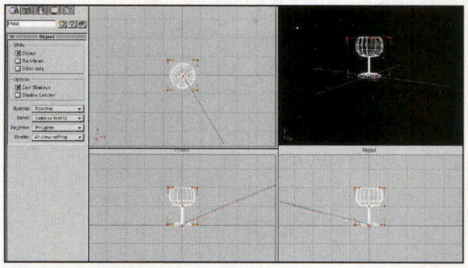
2 Create a new *Bryce* document at 640x480. Click on the Create Terrain tool, then click on the Terrains Edit tag to open the Terrain Edit window. Click on the Pictures tab and click Load above the far-left box. Select your volcano image, and the image appears in the box. Click Apply to update the Terrain Preview.



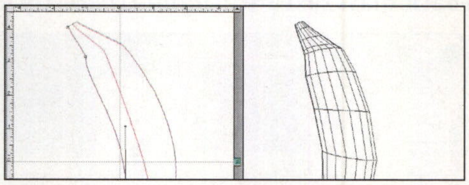
3 Exit the Terrain Editor, position your terrain and camera, then render a preview. Re-enter the Terrain Editor if you want to and edit the image within *Bryce* for erosion effects and so on, to add realism.

Three: Going bananas with spline-based objects

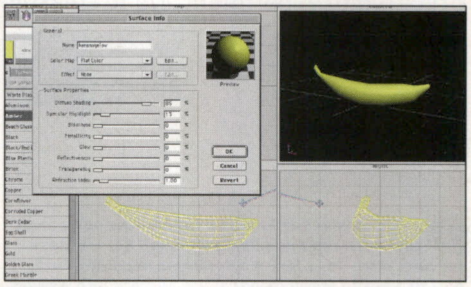
Spline-based objects enable easier control and more efficient model meshes. We're using *Infini-D* here – demo on the CD...



1 Begin by creating a wine glass from *Infini-D*'s Create Lathe Objects panel. In fact, the choice of initial objects is not too important – but the wine glass is a good choice, as its cross-section (circular) and height approximate to that of a banana.



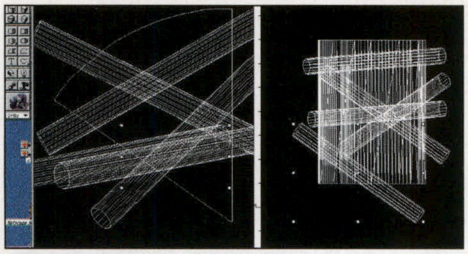
2 Double-click the glass to go to Workshop mode. Switch Layout to Path Extrusion mode. The blue lines are rails, showing extremities of cross-sections. Click and drag on the end of the red in the Path Front window towards top-left. Delete points in between and drag the bottom point in the other direction to get a curved path. Alt/Option-click along the blue line of the rails to add points, and drag these to match the path curve. Exit Workshop when you're satisfied.



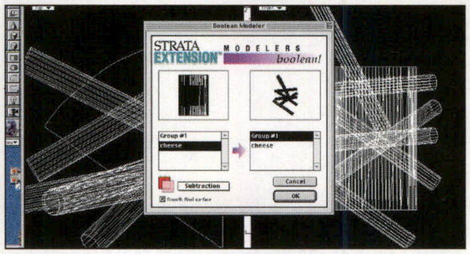
3 Go to the Basic Textures panel. Copy one of the plastic materials and rename it 'Banana Yellow' or similar. Edit the colour to yellow, exit the Surface Editor and Apply to the model by double-clicking. Yum!

Four: Unions and subtractions

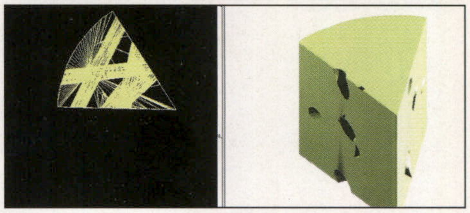
It's possible to model by adding or subtracting objects to/from one another using Boolean modelling techniques. We've created this Swiss cheese in Strata *StudioPro* – have a go using the demo on the CD...



1 Begin by creating the basic shape of the cheese by editing a circle in the 2D Modeller into a segment shape. Then extrude the shape to give the 3D form.



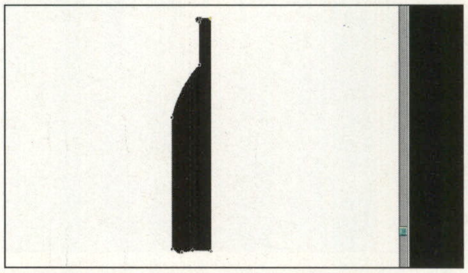
2 Next, create a number of cylinders. Simply duplicate the same cylinder, then rotate to various angles. Group all the cylinders and arrange them so that they intersect with the cheese shape.



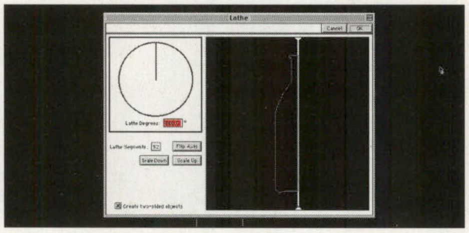
3 Go to Modelling>Boolean, then change the operation from Union to Subtraction. Select the Cheese shape in the left-hand box, and the cylinder group from the right. Click OK and confirm the breaking angle (default 60-degrees). Wait a few seconds for the program to calculate the Boolean.

Five: Simple lathed objects

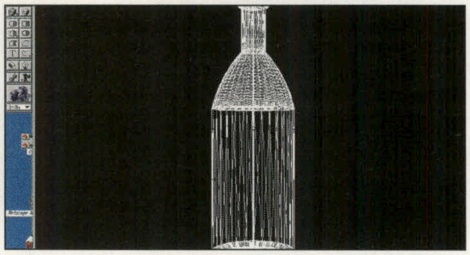
This is the potter's wheel of 3D. You can create many objects by taking a basic shape or outline, and then rotating it partially or fully 360-degrees around an axis. Here, we create a wine bottle in Strata *StudioPro* – demo on the CD...



1 Draft the basic outline of the bottle in the 2D-shape editor. Alternatively, you could import the shape from an Adobe *Illustrator* file.



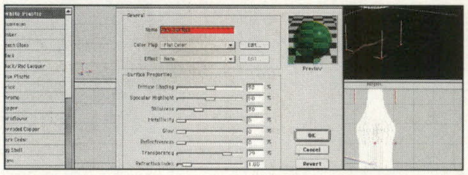
2 With the outline shape selected, click on the Lathe tool. Position the axis at the imaginary centre-line of your bottle. Check the Lathe Degree box is set to 360: you can increase/decrease this in Lathe Segments for a smoother or more faceted end result.



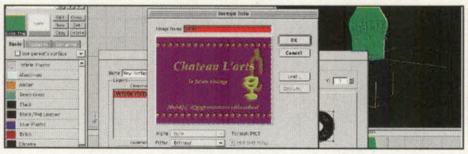
3 The default 32 is okay in most cases. If you require your bottle wall to have more thickness, then check the 'Create Two-Sided Objects' box. It's as easy as spin-the-bottle!

Six: Materials and mapping

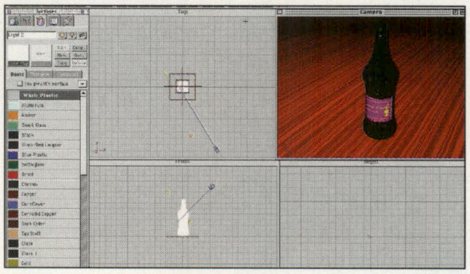
Most 3D packages use an in-built set of materials to texture models – but to get the best results, you should be prepared to experiment. We're creating a basic glass texture in *Infini-D* here: try it with the demo on the CD...



1 Open your bottle model (or create one), select and open the Basic Texture panel. Select Glass texture, click Copy to get a duplicate and Edit. Next, edit to a bottle green colour in the Surface Info window. Glass has a low value for diffuse shading & high values for specular highlight, shininess & transparency. The refraction index is typically 1.1. Set reflection value to 20%, click OK to close. You now have 'Glass1' texture.



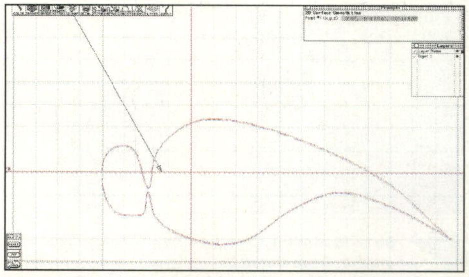
2 Click Comp to compose a surface. Click Add in the Surface Composition window and add Glass1. Click Add again and go to Load Image (pull-down menu). Select the image for your label, select the label in the Layers box, click Mode & change Mapping to Cylindrical. Use the Move arrow to position the outline of the label. Set Wrap Around slider to 150-degrees. Select White Plastic in the Layers window, click Delete. Then drag the label so it's the outermost layer (below glass surface).



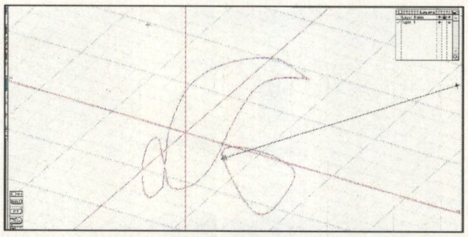
3 Test render the bottle. You may find it takes a few attempts to get the label position and the look of the glass just right.

Making a clean sweep to create a fly Stage one: Thorax /abdomen

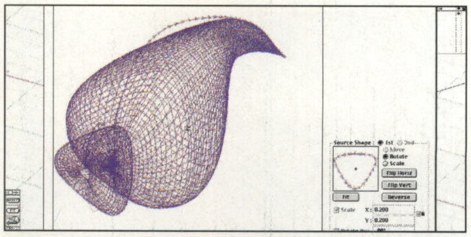
Sweeping is a hybrid of the Lathe and Extrude modelling methods. It enables the creation of more intricate and interesting forms. Here, we use the different sweep functions in *form•Z* to create a fly – demo of v3 on the CD...



1 In *form•Z*, set the Reference Plane to XY. Use the Smooth Line tool to generate the two curves which will form the boundaries of the sweep.

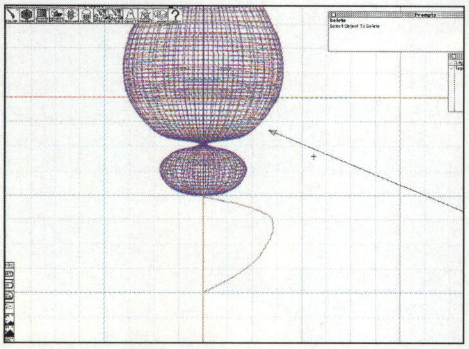


2 Click on the Reference Plane tool and switch the Plane to YZ. Use the Line tool again to create the shape, which will be swept along the paths. This will be a closed path, so double-click on the start/end points to close.

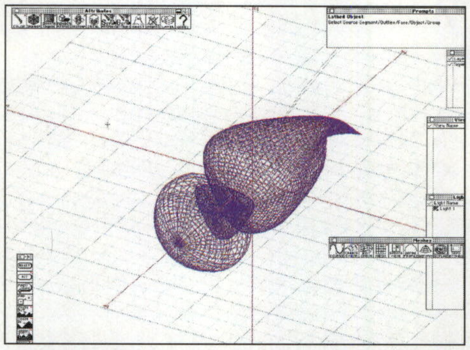


3 Select the shape and then Alt/Option-click the Sweep tool. Set the sweep to 'Two Path Sweep' from the dialog box. The Sweep window shows the resultant form as a preview. Click OK and there you have it – one fly thorax and abdomen.

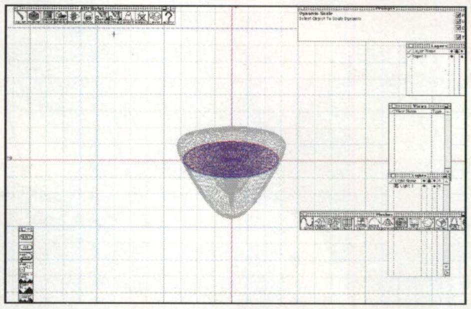
Stage two: The head



1 First, set the view to top. Then, generate an arc using the Smooth Line tool, and this forms the basis for the revolve.

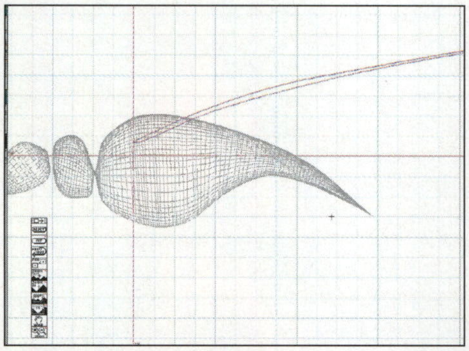


2 With the arc selected, click on the Revolve tool. Click on the Z axis (the red line). By default the arc is then spun through 360-degrees.

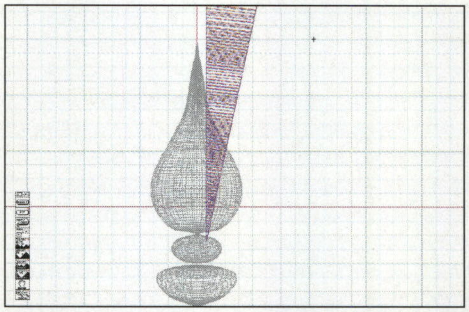


3 This produces a very spherical head. To make it more realistic, use the Scale tool to flatten the overall shape along the Y axis. This gives a nice almond-shaped head. Switch to a side view and use the Move and Rotate tools to align the head with the body.

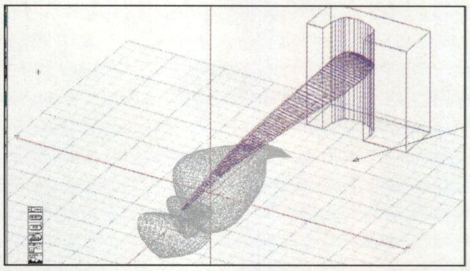
Stage three: The wings



1 Now, switch views to a side elevation. You can use the Smooth Line tool to create the shape of the wing cross-section.

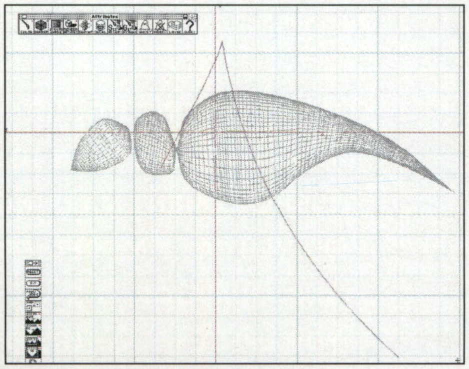


2 Switch to 30/60 view. Alt/Option-click on the Revolve tool, and set the Revolution Angle to 12-degrees in the dialog box. Now select the wing profile and click on the Y axis (vertical red line). This creates the basic shape – but it's too hard edged.

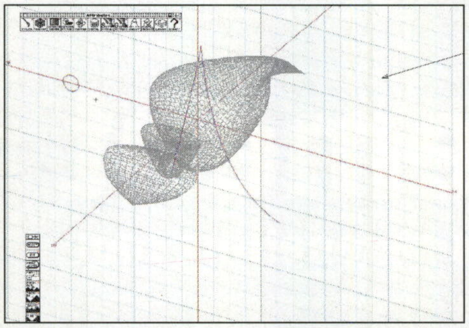


3 In the top view, create a shape that follows the outline of the trailing edge of the wing (rounded at the corners). Go to Extrude, and extrude the shape to get a cutting die. Now select the Boolean Difference tool. Click on the wing, then on the die. The Boolean operation cuts the corners to give the wing rounded corners. Create a duplicate with Mirror in Copy mode.

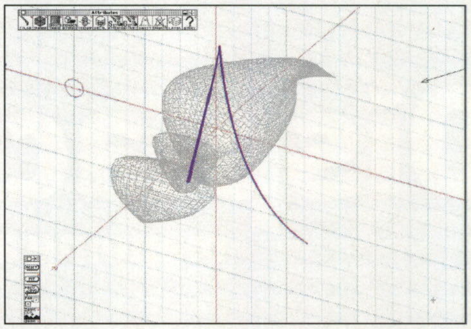
Stage four: The legs



1 Switch to a side view, and use the Smooth Line tool to create the two separate arcs for the legs.



2 Switch to a 30/60 view and use the Circle tool to create a small circle. Alt/Option-click the Sweep tool and select Axial Sweep. Click on the circle first, then on the arc to create the Sweep Preview.



3 Scale the circle in the Preview to create a tapered leg. Repeat the procedure for the second arc to make the second leg segment. Finally, duplicate and position each leg – and there's your fly.

technique two

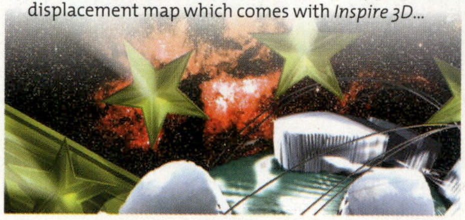
Displacement
mapping as a modelling tool

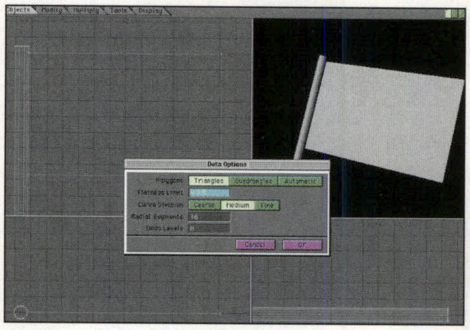
IN THE SECOND OF OUR TUTORIALS, WE TURN TO DISPLACEMENT MAPPING, USING IT AS A MODELLER AND ANIMATOR. IT'S A POWERFUL TOOL – TRY IT WITH PROGRAMS FROM THE MID-RANGE AND UP...

One: Making a model flag animation

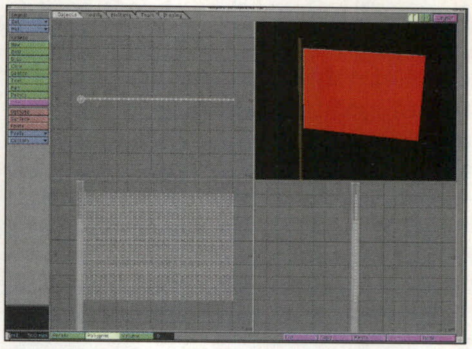
To start off, we're going to use displacement maps to model and animate a flag. We've used *Inspire 3D* – try this using any good 3D program...

As well as being a modelling tool, you can also use displacement maps to produce animations. For this, you need an animated displacement map, the movement of which will be reflected in your model's mesh. Usually this is in the form of a greyscale QuickTime movie or .AVI file – but here we're going to look at a procedural ripple displacement map which comes with *Inspire 3D*...

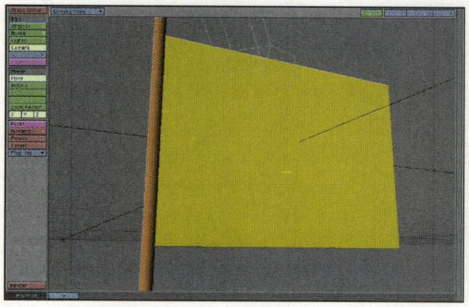




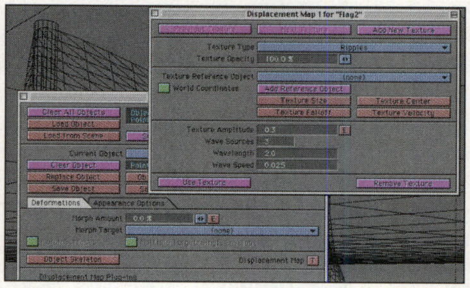
1 First, we need to model the flag. You need to create the flag itself so that it responds properly to the displacement map. This means giving it a sufficiently fine mesh that deforms to produce the desired ripples. Before you start, bring up the Data Option panel (Options button, Objects tab), and click on Triangles. This means that the pane of the flag will be composed of four triangular polygons, instead of one rectangular polygon.



2 After you've created the flag, you need to subdivide it to get a fine enough mesh. Do this using the Sub-divide button from the Multiply tab, ensuring the Option is set to Faceted (about five sub-divisions should do the trick). For the flagpole, click on a new layer before you start constructing, and assign a unique surface colour and name to the flag and flagpole. Save the whole thing with an '.lwo' extension.



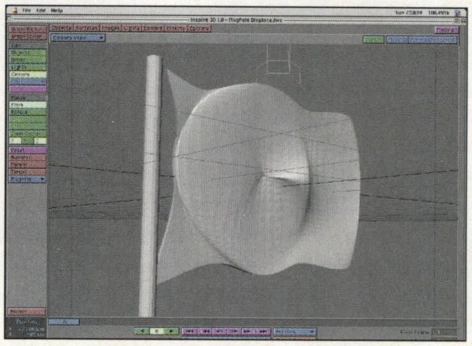
3 Now it's time to animate the flag. Take the flag object into the Layout portion of *Inspire*. Click on the Layout button in the top right-hand corner of the Modeller window, then in Layout use the Add button to bring the Flag.lwo object (or whatever you've called it) into the Main window. Next, set up a view by manipulating the camera. You'll have to keep flicking back and forth between Camera view and the others, since *Inspire 3D* doesn't enable you to directly manipulate the Camera's viewpoint.



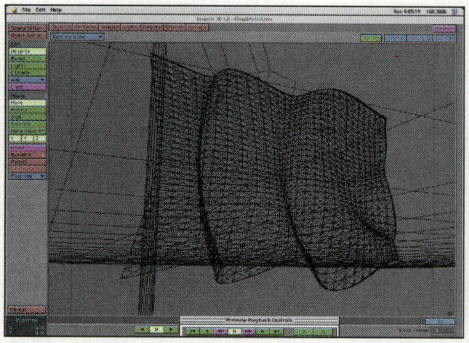
Displacement Map 1 for "flag2"

Texture Type: Ripples
Texture Opacity: 100.0 %
Texture Reference Object: (none)
Texture Amplitude: 0.3
Wave Sources: 3
Wavelength: 2.0
Wave Speed: 0.025

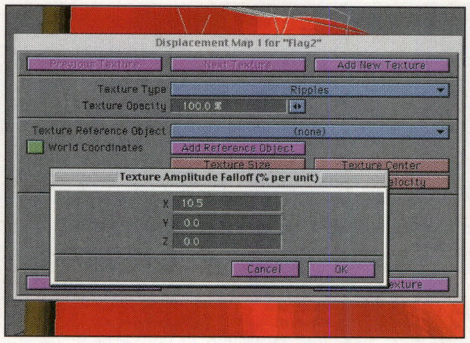
4 To assign the displacement map, click on the Object button. On the subsequent Deformations tab, click on the 'T' next to where it says 'Displacement Map'. *Inspire 3D* has some ready-defined displacements in its Texture Type pop-up menu, but other programs may enable you to load a QuickTime or .AVI file at this point. Here, we've chosen the Ripple displacement. Values are then added for various parameters of the displacement. Note: if you were using a ready-made movie as a displacement map, you'd have to get all the parameters right before importing it.



5 Here's the first QD3D preview of the flag object. It doesn't look right at all, so it'll have to be tweaked to get the desired effect. You can see that the ripples start from the centre, and we need to hide the source of the ripples for the flag effect. Now is a good time to do a Preview animation to gauge the effect. In *Inspire 3D*, you can just click the Preview button to get a wireframe animated render.



6 To make the flag more realistic, the centre of the ripple needs to move to beyond the right-hand edge of the flag, using the Texture Centre button from the Displacement Map panel. Numeric co-ordinates must be entered, but other programs may enable you to adjust the position graphically. You can see the motion is now more flag-like, but the end closest to the pole still moves around too much.



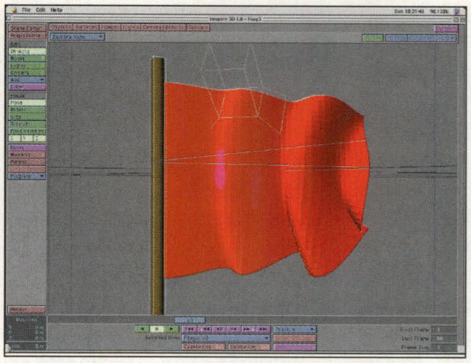
Displacement Map 1 for "Flag2"

Texture Type: Ripples
Texture Opacity: 100.0 %
Texture Reference Object: (none)

Texture Amplitude Falloff (% per unit)

X 10.5
Y 0.0
Z 0.0

7 The Texture Falloff button in the Displacement Map panel varies the amount of displacement along one axis. In this case, the length of the flag lies in the X axis, so the value needs to be entered in that field. Here, we found 10.5% to be about right. If you were doing this with a QuickTime or .AVI file, you'd have to lower the contrast between light and dark at one side of the movie frame.



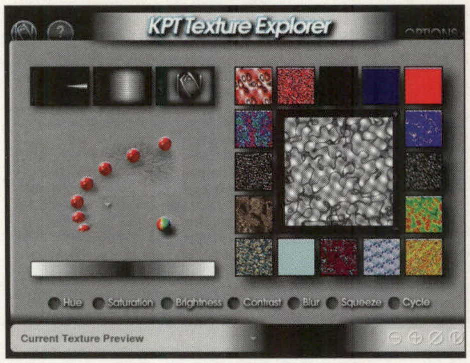
8 When everything's set, the flag should look like... well, a flag, with one end flapping wildly, and the flagpole end tethered. Imagine doing that with bones! As a final touch, you can use your program to assign a decal (logo, badge or insignia) to the flag. This is where programs that support UV mapping excel, as the decal won't smear or distort as the flag billows.

⇨

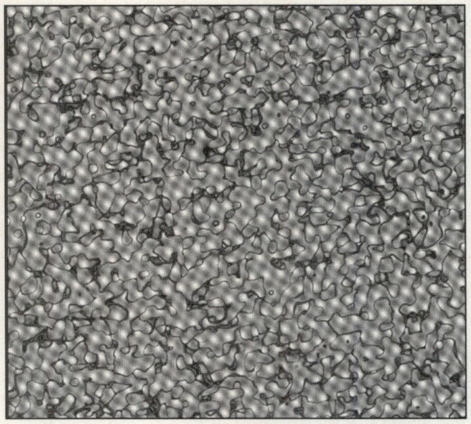
Two: Using CyberMesh to generate displacement maps

Now we'll use this *Photoshop* plug-in to generate displacement maps (the demo's on the CD). To finish off you can use any good 3D package...

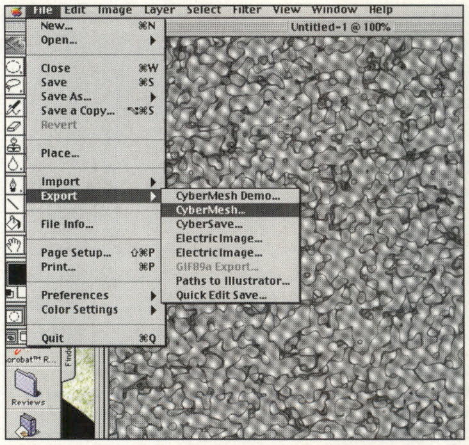
Generally, all displacement maps start off life as greyscale images, with varying levels of light and dark providing the information for the height of the surface. Since *Photoshop* is the 3D artist's favourite companion for the production of these maps, it's logical that there's a plug-in that combines the greyscale map production with mesh generation. *CyberMesh*, is available as a demo from **w** www.puffindesigns.com



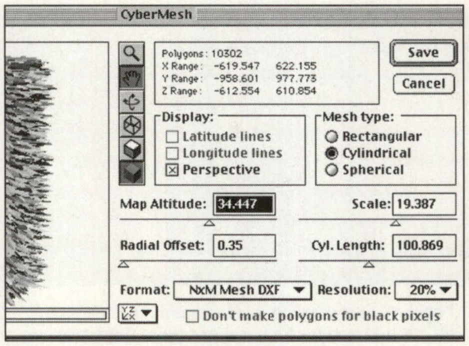
1 **A great place to start for displacement map images is *Kai's Power Tools* Texture Explorer, under *Photoshop*'s Filters menu. Before you start, make sure you have an open, empty document which is in greyscale mode, since *KPT* Texture Explorer places your chosen texture in the front-most Document window in *Photoshop*.**



2 **This started out as a 'What if..?' session, with no particular goal in mind. The texture was chosen simply because it looked interesting, and because it had a good range of greyscale tones.**



3 **The *CyberMesh* plug-in is under File>Export, since the ultimate action of the plug-in is to produce a DXF file for export to a modelling program.**



CyberMesh

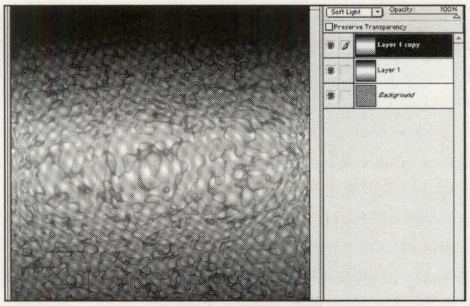
Polygons : 10302
X Range : -619.547 622.155
Y Range : -958.601 977.773
Z Range : -612.554 610.854

Display:
☐ Latitude lines
☐ Longitude lines
☒ Perspective

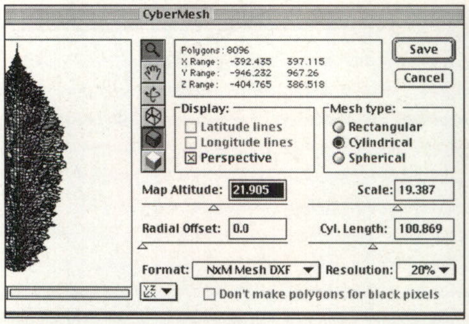
Mesh type:
○ Rectangular
● Cylindrical
○ Spherical

Map Altitude: 34.447
Scale: 19.387
Radial Offset: 0.35
Cyl. Length: 100.869
Format: NxM Mesh DXF
Resolution: 20%
☐ Don't make polygons for black pixels

4 **When the greyscale map is opened in *CyberMesh*, it's automatically converted into a 3D displacement-mapped object. You can play with the mapping modes to get planes, spheres or cylinders, and alter the overall dimensions of your object and the height of the displacement spikes. Pity the preview isn't bigger, though – because something was suggesting itself already...**



5 **The next stage is to alter the displacement map so the final mesh shape is more like the object we now have in mind. To this end, use the Spherize filter a few times across the centre of the image to increase the size of the individual 'cells' in the texture. Then lay two copies of a black-white-black gradient over the image on a separate layer, and blend using the Multiply and Soft Light Blending modes. The idea here is to make the spikes larger and longer in the centre, tapering off at either end.**



CyberMesh

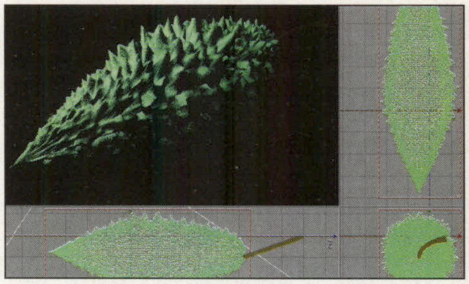
Polygons : 8096
X Range : -392.435 397.115
Y Range : -946.232 967.26
Z Range : -404.765 386.518

Display:
☐ Latitude lines
☐ Longitude lines
☒ Perspective

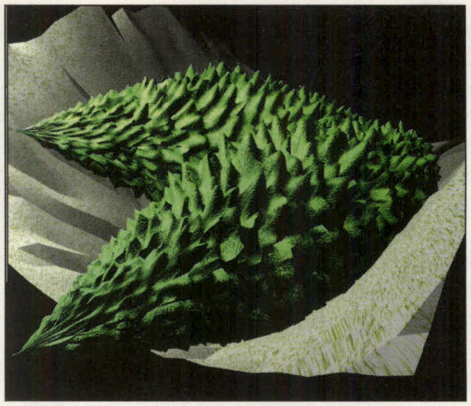
Mesh type:
○ Rectangular
● Cylindrical
○ Spherical

Map Altitude: 21.905
Scale: 19.387
Radial Offset: 0.0
Cyl. Length: 100.869
Format: NxM Mesh DXF
Resolution: 20%
☐ Don't make polygons for black pixels

6 **When this is re-exported via *CyberMesh*, here's the result. By setting the Radial Offset to zero, the mesh becomes more pinched in areas where there's more black in the original map. The exported format chosen was the NxM Mesh DXF option, which generally has the least amount of problems distorting mesh geometry. After a bit more tweaking of the Scale and Altitude values, we arrive at the shape we want. Can you guess what it is yet?**



7 **For the finishing touches, we imported the mesh into *Cinema 4D* for final rendering and a little more modelling. Of course, no matter how detailed mesh geometry is, it's never enough to produce a convincing result on its own. We designed a few textures with our target object in mind, and also set the rendering Smoothing option to 120-degrees. This rounds out the spikes present in the original *CyberMesh* DXF, and gives us the final shape. Doesn't it look like one of those things you find next to the mangos in the supermarket?**

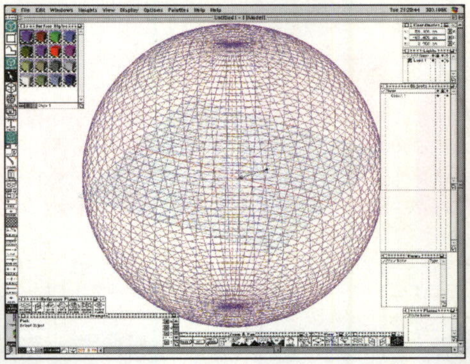


8 **A few more things to finish off. We modelled a stalk in *form•Z*, then the fruit was duplicated and rotated slightly. The paper was also generated using a displacement map, this time directly in a modelling program on a flat mesh. Good enough to eat, nearly.**

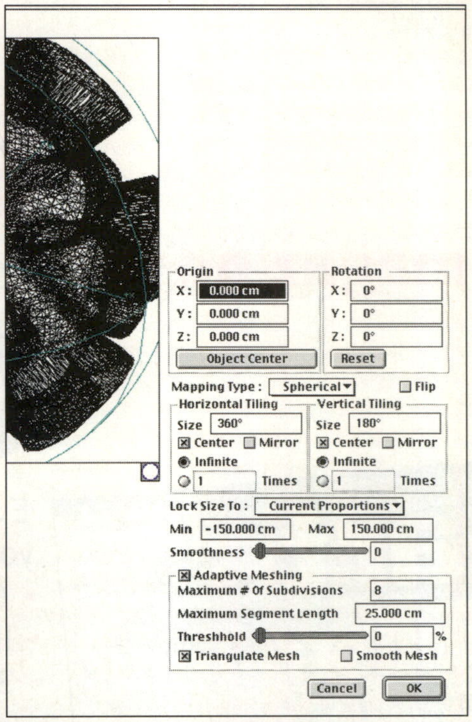
Three: Using displacement mapping to create a cartoon ice world

The final stage of our 3D skills tutorial looks at creating a cartoon world. To do this, we've used *form•Z* – but again, you can use any good 3D package...

This final section deals with 'straight' displacement mapping: that is, using maps within modelling programs to produce geometry modifications that would be difficult, impossible or too tiresome to do by hand...

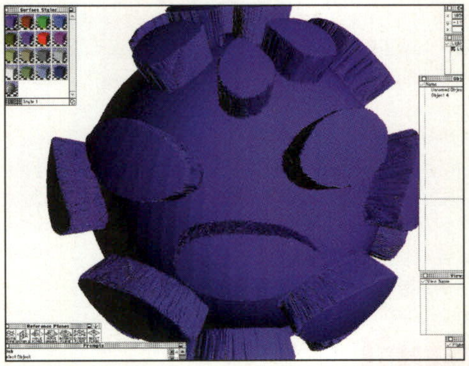


1 **To start off building your world, you need to create a sphere. Displacement mapping works best with finer meshes – but remember, for maximum memory efficiency with spheres, the longitudinal segments should be twice as many as the latitudinal segments. Setting these two values equal is a waste of resources, since it doesn't give any additional benefits.**

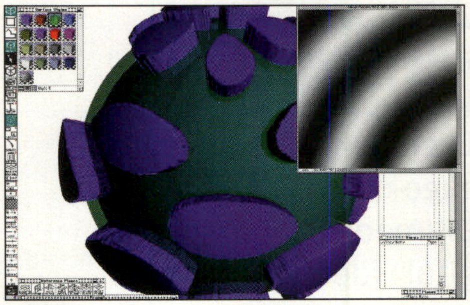


Origin
X: 0.000 cm
Y: 0.000 cm
Z: 0.000 cm
Rotation
X: 0°
Y: 0°
Z: 0°
Mapping Type : Spherical
☐ Flip
Horizontal Tiling
Size 360°
☒ Center ☐ Mirror
● Infinite
○ 1 Times
Vertical Tiling
Size 180°
☒ Center ☐ Mirror
● Infinite
○ 1 Times
Lock Size To : Current Proportions
Min -150.000 cm
Max 150.000 cm
Smoothness 0
☒ Adaptive Meshing
Maximum # Of Subdivisions 8
Maximum Segment Length 25.000 cm
Threshhold 0 %
☒ Triangulate Mesh
☐ Smooth Mesh

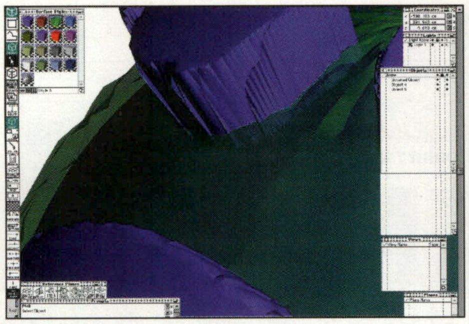
2 **Next, you need a displacement map. For this cartoon-style world, we just used a series of roughly-drawn white circles on a black background (visible top-right). Generally, the finer your mesh, the better the result, but the more memory-intensive and slow the manipulation is. The program being used here (*form•Z*) is an exception, since it can start with relatively coarse meshes and apply Adaptive Smoothing (increase the mesh density in regions of high curvature). The dialog is rather complex, reflecting *form•Z*'s power, but the two most important fields are the Horizontal and Vertical Tiling (which determines how many times the displacement map is wrapped around the sphere); and the Maximum and Minimum displacement fields (how high/low the displacements will be.)**



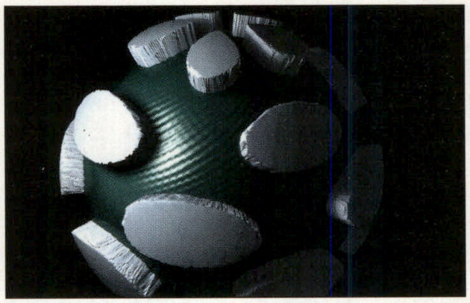
3 **After you click OK you get your globe: this may take quite a while, depending on the speed and memory of your machine. This is shown in a QuickDraw 3D render, which enables fast previewing of complex objects, and is recommended (along with OpenGL if your machine supports it) for manipulating complex meshes like these.**



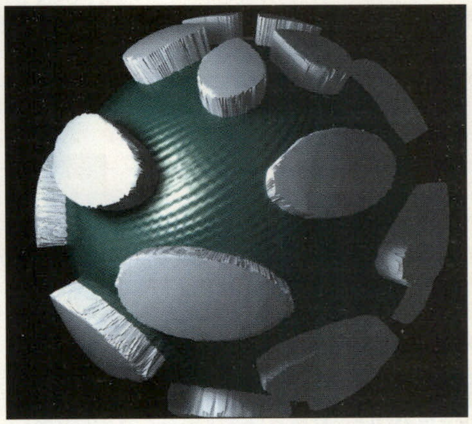
4 **The next stage is to add the sea, which is simply another sphere, slightly larger than the original and sharing the same centre point. It's transparent here, because we're viewing it in Preview Ray Trace mode. This is a mode which supports transparency, but is too slow for manipulating models in real-time. The inset at upper right is a detail of the displacement map we're going to use to supply the waves. It's just a series of black and white circles, composed and blurred in *Photoshop*.**



5 **The displacement map was applied as for the original sphere, except in this case it was applied twice to the same sphere, the second time at a 90-degree offset to the first. This gives the impression of lapping waves in the final render. This screenshot shows the main advantage of displacement mapping over bump mapping: you can see the edge of the water displaced against the background, whereas with bump mapping it would have been perfectly smooth.**



6 **The first render proper shows the effect of the two displacement effects: the modelling around the sides of the 'ice floes' and the ripples of the waves on the water, both achieved with no 'real' modelling. To get the waves that fine using displacement mapping requires a fine mesh for the water sphere and a powerful computer (this was done on a G3 PowerMac with 512Mb of RAM). So, as always in 3D modelling, you have to choose your techniques according to your capabilities and resources.**



7 **Finally, all the pieces are in place – lighting, texture and bump maps on the ice floes, plus clouds grafted on by virtue of a transparency, bump, and texture-mapped sphere.** ca•s

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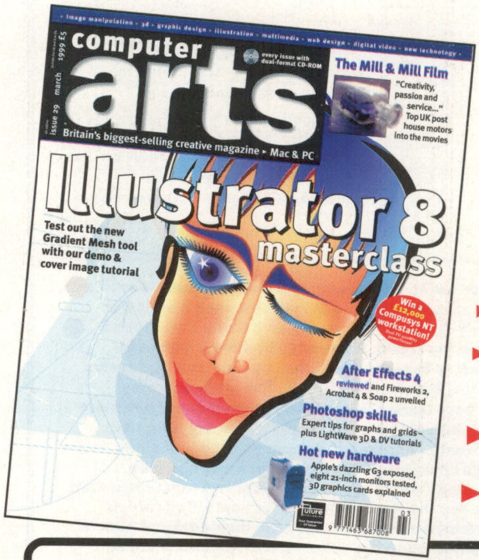
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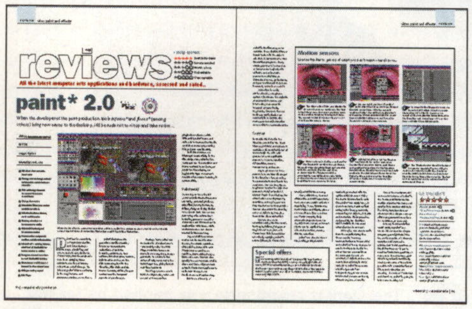

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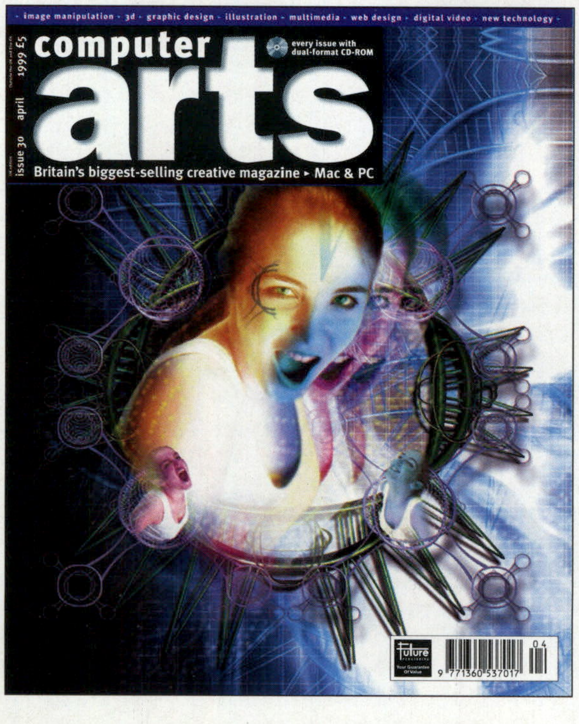
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technique three

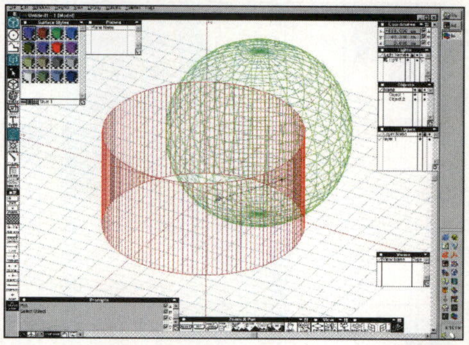
Boolean

sculptures

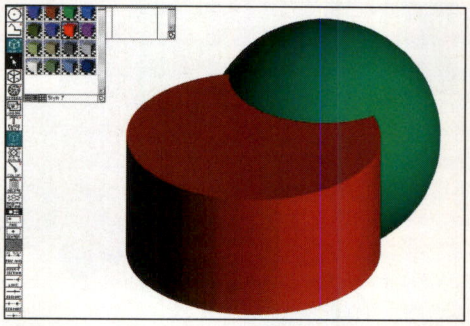
Boolean operations are some of the most powerful in 3D modelling, enabling you to ‘carve’ out shapes – using one object to take a bite from another...

One: Getting started

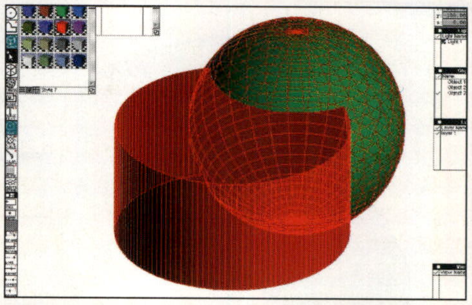
Here are the basics of Boolean modelling. We're using *form•Z* – but any 3D software that supports Booleans will do...



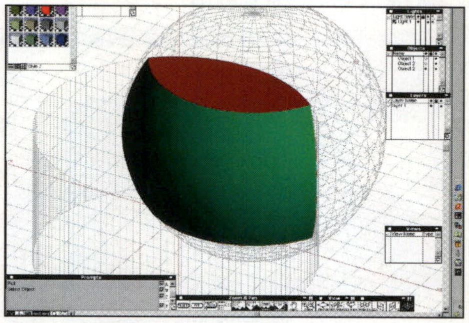
1 To demonstrate the essence of Booleans, we'll start off with a pair of objects which are overlapping. Here we're using *form•Z*, since it has very robust Booleans – and there's a demo of v3 on the CD. However, the essential logic outlined here is common to all programs that support Booleans.



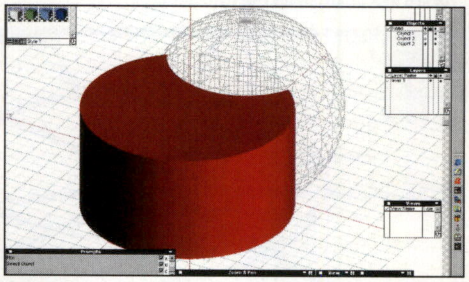
2 Next, if we do a render, you'll see that the two objects are actually overlapping. Most renderers can now resolve intersections like this with ease – and this type of intersection is just like a Boolean union. So why bother with Booleans in this case? Two reasons: first, sometimes the renderer can't cope with the intersection, especially if it's a complex one...



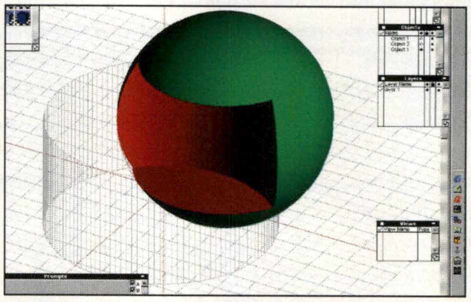
3 ...and second, as you can see here, if you Boolean union the two objects (choose the Union tool, then click on one, then the other), and click on them, you'll see that the two objects are now one – even though they're maintaining their original surface colours. Remember that unioning is not the same as grouping: there has to be a physical overlap, and geometry is always altered.



4 This is a Boolean intersection. Only the area(s) where objects actually overlap is left after the operation. This picture is a composite of the render and the ghosted wireframe, so you can see what's going on. Notice how the red surface of the cylinder has been transferred to the part of the intersection. This is a characteristic of Boolean operations.



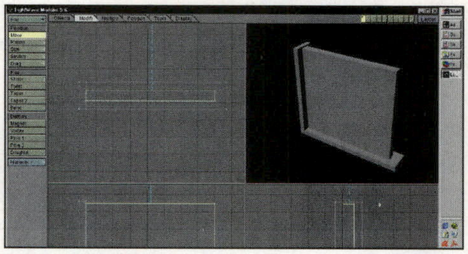
5 Probably the most common type of Boolean operation: the difference, or subtraction. Here you can see how the sphere has taken a chunk out of the back of the cylinder. If you could see behind, the green surface of the sphere would be left on the back of the cylinder. In these cases, most programs are particular about the order of selection of the two objects, because we could equally derive from these two objects...



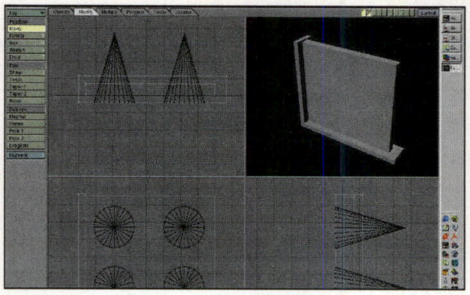
6 ...this result. This is the outcome of subtracting the cylinder from the sphere. In *form•Z*, the second object chosen is subtracted from the first – but this can vary from application to application. Note how the application has had to create new geometry to form the slot. It's this new geometry that makes Boolean operations time- and memory-intensive, especially noticeable on older machines.

Two: LightWave and Inspire 3D

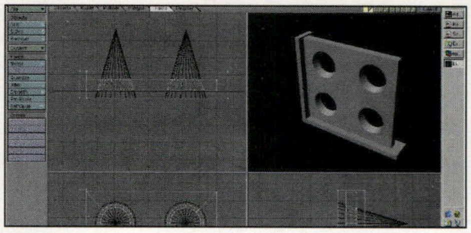
You've seen how *form•Z* handles Boolean operations – here's how it's done in *LightWave* and *Inspire 3D*...



1 Next, we'll see how *Inspire 3D* does it. This is the most affordable program on the market to offer a full set of Boolean operators. Shown here is *LightWave 3D*, *Inspire*'s big brother – but the two programs function identically. First, we make an object, then position a cone which is our cutting object. Then we duplicate the cone four times.



2 Next, we need to place the cones on a background (inactive layer). You do this by cutting and pasting them into another layer and setting that to Background – or you could just create them on another layer to begin with.

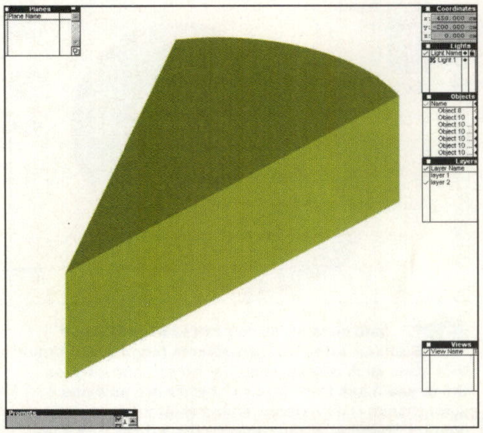


3 With *LightWave*, anything on a background layer is Booleaned with anything on the current foreground layer(s). Make multiple foreground layers active by Shift-clicking so the Boolean objects can act across multiple layers. Choosing Boolean from the Tools tab then presents a list of the four available Boolean operations: Union, Intersect, Subtract and Add. Here, we chose Subtract to punch out the holes.

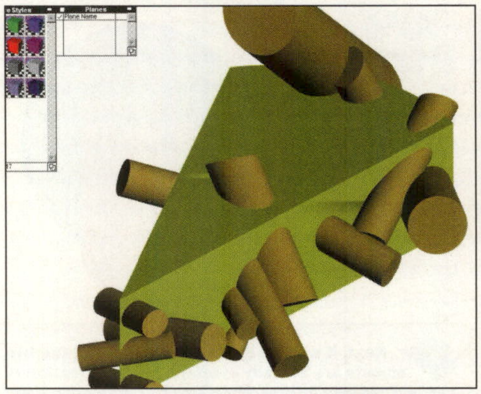
⇨

Three: Get modelling

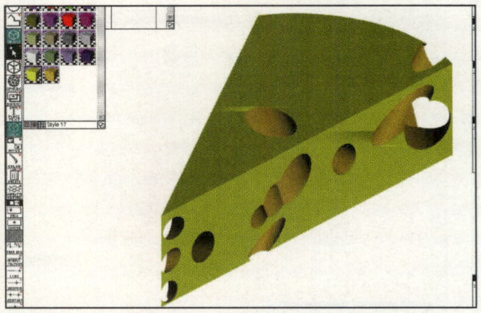
After our brief interlude with Newtek's packages, it's back to *form•Z* to continue our walkthrough...



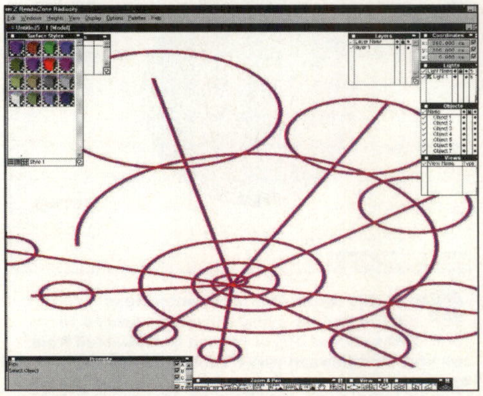
1 Now for a real bit of modelling: we first take our piece of cheese. This is simply an extruded outline drawn with the Line and Arc tools.



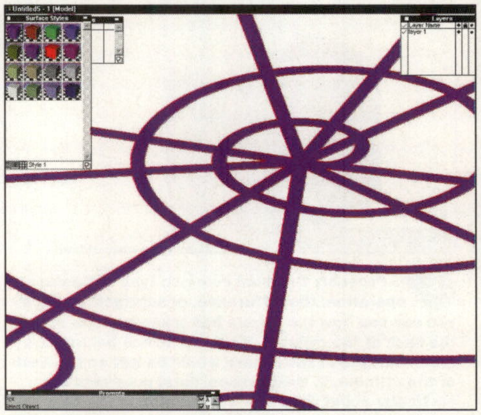
2 Then we fill it full of cylinders. When doing real world Booleans, the creation and modelling of the cutting pieces is often the most critical part. This is a fairly random example, but it still takes time to scale, rotate and position all the cylinders.



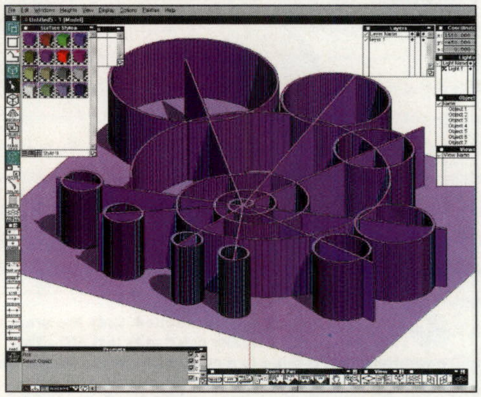
3 The next step is to Boolean Subtract the cylinders from the cheese wedge. You can do this one at a time or you can group all the cylinders so they can be selected as one object: choose Subtract, then the wedge, and then the grouped cylinders. Each way has its merits. Do it bit by bit and you save time as you go along, since in low memory situations Booleans can make any program crash; while all at once means you can get on with something else.



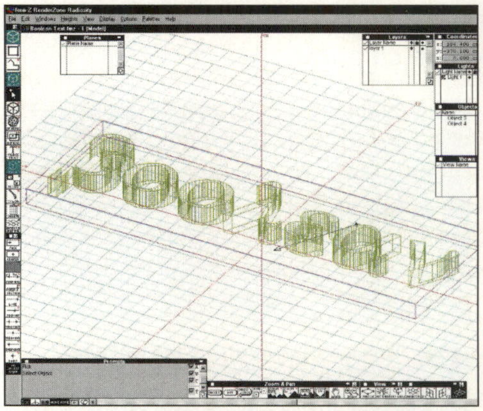
4 Now we're going to work smart with Booleans. Unlike most other programs, *form•Z* enables the use of 2D shapes as Boolean operands. This construction is made up of a lot of many-sided shapes, so it's best to union them now rather than later.



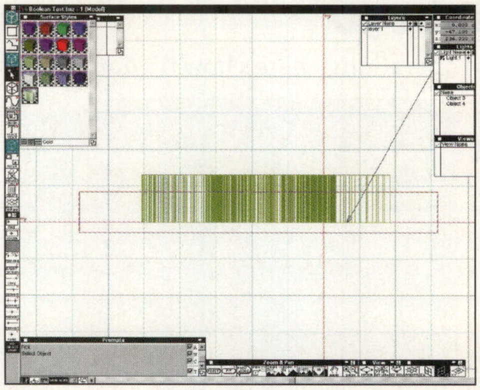
5 After selecting all the shapes and the Union function, you can see that they're now a single surface – there are no crossing-over lines. It's now much easier to use this as the basis of an Extrude operation.



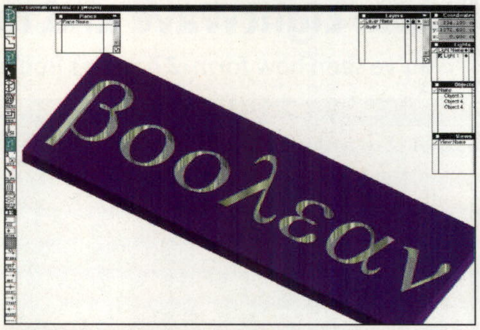
6 After extruding the surface, you can see that such a many-faceted object would take much longer to operate on as an object composed of separate 3D entities. In fact, it took four times longer (and as much memory again) when performed on the 3D entities.



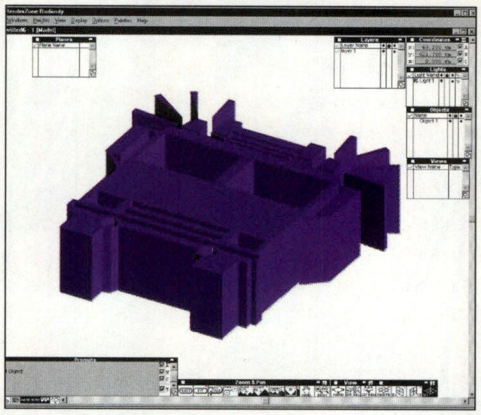
7 You can also use text in Boolean operations – in 3D programs it's just another object. Here, we've imported some text in the Symbol font into *form•Z*, extruded it and added an extruded base plaque.



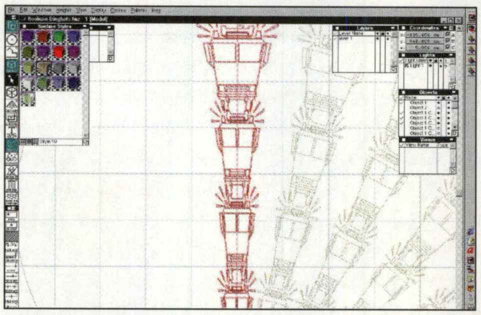
8 Next, simply manoeuvre the font object into place, so that it protrudes above the top, but not through the bottom of the plaque. Also, note that font objects are single objects, not individual letters. If you want separate letters, enter them individually.



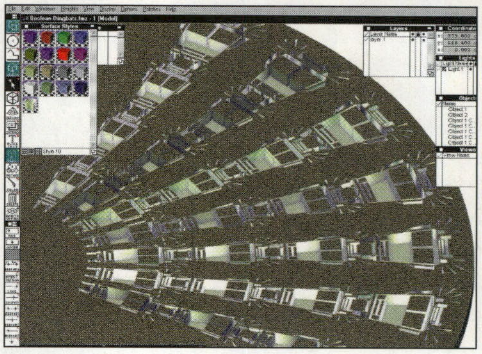
9 By assigning the text a metallic gold colour, we were able to make sure that this was left behind when we did the Boolean Subtraction – assuring a pleasing engraved effect for very little effort. This technique is therefore sometimes the only way to assign a particular texture to a particular surface of an object. Many programs simply don't enable polygon-by-polygon texture assignment.



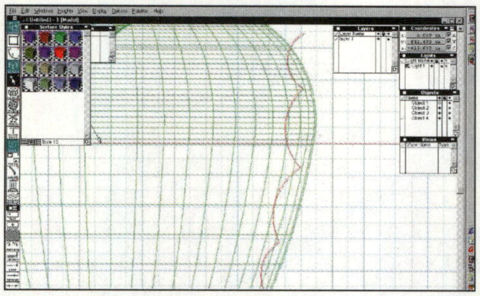
10 Dingbats are icon-based fonts that provide a good source of character shapes for Boolean operations when extruded: think of them as ready-made templates. This one's from the Webdings collection.



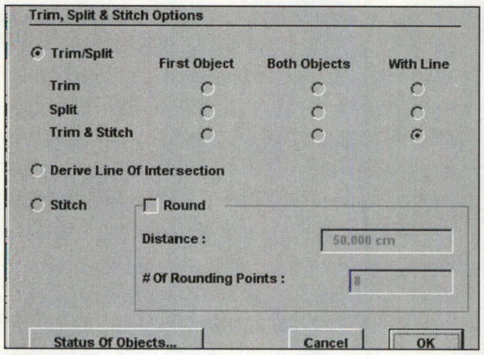
11 Being simply another 3D object, you can rotate and scale text. Here, we're creating a repeating and rotating pattern from our original Dingbat text object. One thing to watch out for here is that sometimes tapering or distorting an object results in the program refusing to perform a Boolean with it. This is generally due to non-planar surfaces. In this case, you'll have to triangulate the distorted object with your program's Mesh tools.



12 The pattern in this plaque was carved by the repeating and tapering series of the previous dingbat. However, be warned: a lot of RAM and patience is needed for this type of work, and even on a fast Pentium II or PowerMac G3, simultaneously cutting out that many templates requires a lot of patience. Still, it beats doing it by hand.



13 Next, we come to a technique closely related to Boolean operations: Trimming. The main difference between Trimming and Boolean operations is that the latter use volumes to carve other volumes, while Trimming uses lines. Here, we've created our apple shape by lathing a profile, and now we're going to take a bite out of it. We've made some 'teeth marks' by simply drawing a line using one of the curve tools. We've given the line an ivory colour, but here it's selected in red too, so you can see it.



Trim, Split & Stitch Options

● Trim/Split

	First Object	Both Objects	With Line
Trim	○	○	○
Split	○	○	○
Trim & Stitch	○	○	●

○ Derive Line Of Intersection

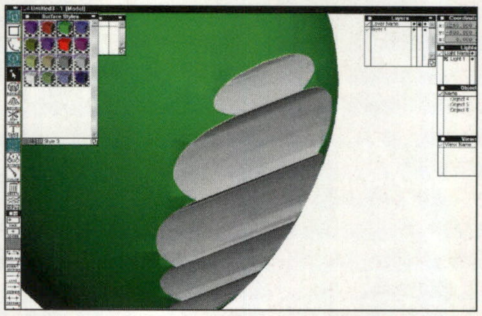
○ Stitch ☐ Round

Distance : 50.000 cm

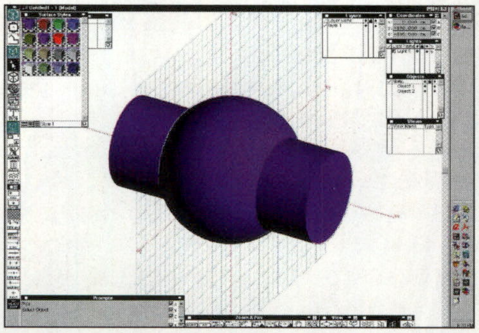
Of Rounding Points : 8

Status Of Objects... Cancel OK

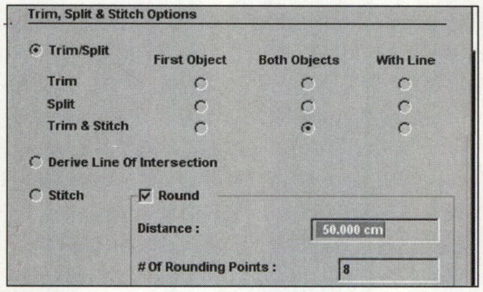
14 There are many options to the Trim and Stitch tool in *form•Z*. We're going to use one of the most simple here, the Trim and Stitch with Line option. You can access this tool in *form•Z* by either double- or Option-clicking on the Trim and Stitch tool. Don't worry about the Stitch and Round options for now – we'll come to these in a minute.



15 The Trim and Stitch operation must be operated in one of the Orthographic views: Top, Bottom, Back, Front, Left or Right. This is because the placement of the line is unimportant, but its projection onto the object is. The program uses the current orthogonal reference plane to project the cut line onto the volume of the apple. Because we chose Trim and Stitch, we've stitched the line's colour onto the apple's surface, which you can see here in this render.



16 Next, we'll look at a more sophisticated use of Trimming and Stitching. Here, you can see a render of two coincident objects, a circle and a sphere. If we'd done a Boolean union on these two objects, the results would look almost the same: the seam between the two objects would be hard-edged and acute. In the real world, joints are almost never like that. There is a solution: Trimming and Stitching with rounding.



Trim, Split & Stitch Options

● Trim/Split

	First Object	Both Objects	With Line
Trim	○	○	○
Split	○	○	○
Trim & Stitch	○	●	○

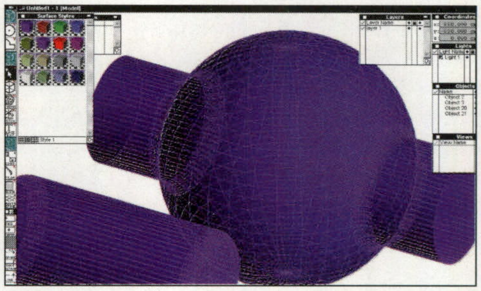
○ Derive Line Of Intersection

○ Stitch ☑ Round

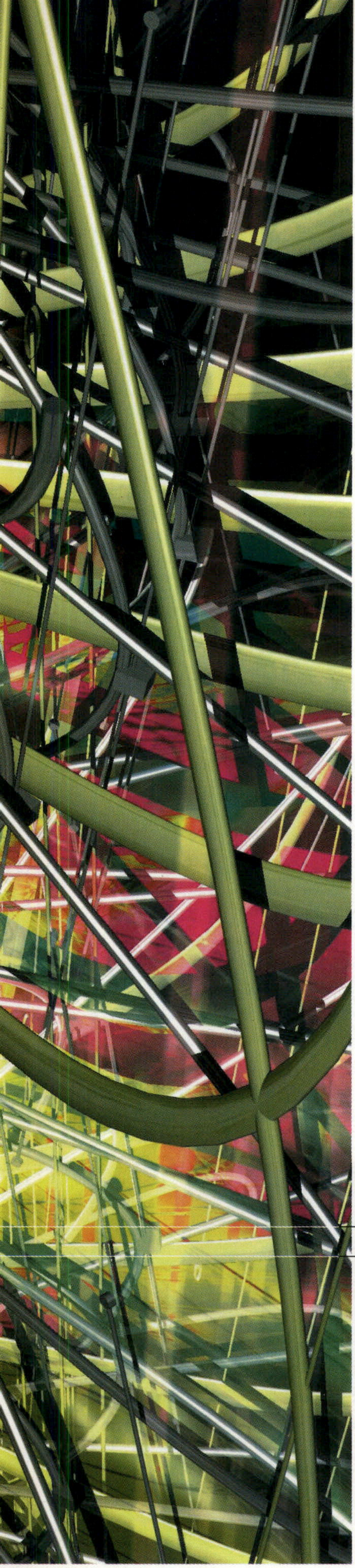
Distance : 50.000 cm

Of Rounding Points : 8

17 Double-clicking on the Trim and Stitch tool brings up the dialog. Now choose Trim and Stitch Both Objects and click in the Round check-box. The Distance value is over how far you want the rounding to extend, and the Number of Points is how many points you want over that distance. Choose these values carefully, since anything too severe causes the operation to fail. Also, you can't expect the operation to work with any old objects – they have to be well-formed, such as no non-planar or self-coincident faces.



18 You can see the results of this composite here. The join between sphere and cylinder is now very smoothly formed, according to the Distance/Number of points entered in the previous dialog. Note also the croquette-shaped object in front: this was originally inside the union because we chose Trim and Stitch Both Objects, so each object has acted on the other one. We've moved it out further here so you can see it. Note also that the cylinder must be equatorial to the sphere for this to work. It won't work axially.



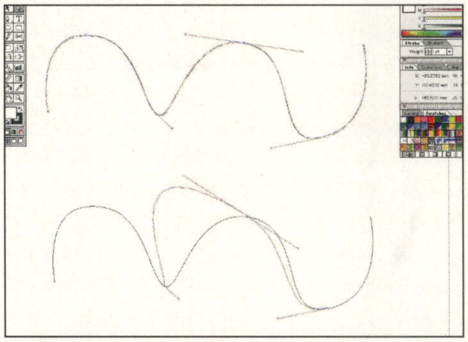
technique four

Splines in 3D

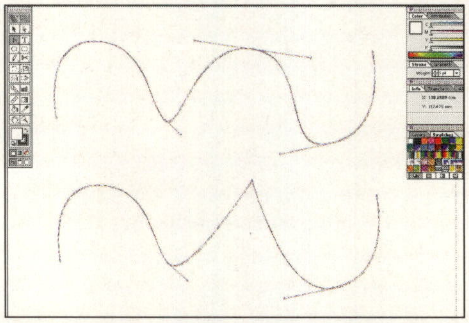
PART FOUR OF OUR 3D TECHNIQUES FOCUSES ON SPLINES: RESOLUTION-INDEPENDENT CURVES THAT DESCRIBE THE CONTOURS OF A SURFACE IN 3D MODELLING. GET THE BEST FROM THEM HERE... ⇛

One: Illustrator splines

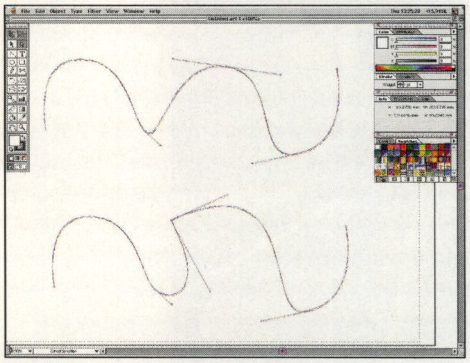
Hang on – what's Adobe *Illustrator* doing in a 3D skills article? Well, most programs support the import of *Illustrator* splines as starting points for 3D modelling, as its curve drawing is arguably the best there is...



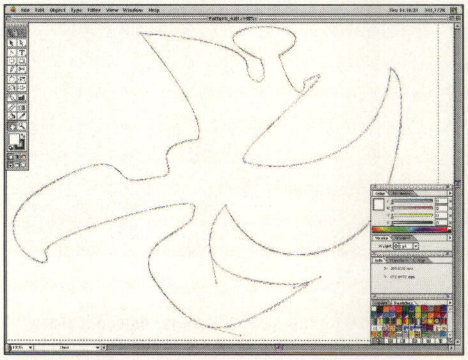
1 Here you can see two simple spline curves in *Illustrator*. The point to note is the tangential control handles which determine how a curve enters and leaves a particular point on the curve. Dragging a handle out makes the approach steep, dragging in makes it shallow. Rotating the handle changes the shape of the curve at the point. Simple, eh?



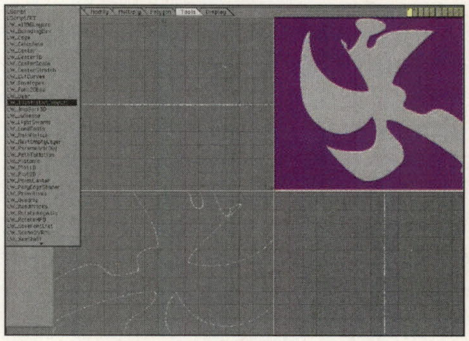
2 The curve points in the previous example are called continuous points. The change of gradient is smooth through them. However, it's possible to introduce abrupt changes by using the Break tool in *Illustrator* (other programs use different conventions, usually Option-click). Dragging on the curve point pulls out a new pair of tangent handles and converts it back to a smooth point.



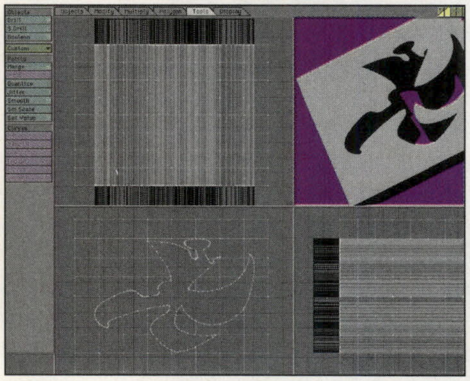
3 The third type of point is the corner point, which has two independent handles which vary the curvature independently on either side of the point. This is done by dragging a handle with the white Arrow tool in *Illustrator*. Some 3D programs with built-in splines have a 'Change Point' tool to do this.



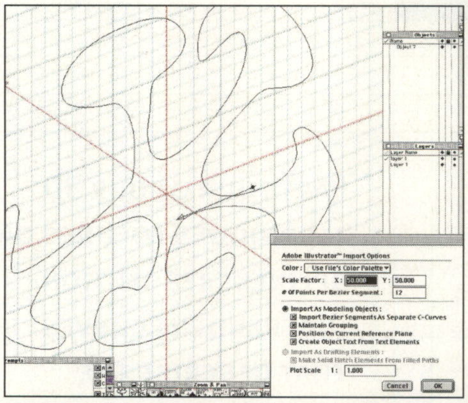
4 So why use a 2D drawing package in 3D modelling? Well, some 3D packages' Spline tools are abysmal. If you've ever used *LightWave 3D* or *Inspire 3D*, you'll know that drawing a curve like the one above is next to impossible. However, it's a cinch using *Illustrator*.



5 Of course, it's no use if it stays in *Illustrator*. *LightWave* Modeller has a plug-in called LW_Illustrator_Import (Objects Tab>Custom button), which enables you to import *Illustrator* curves into a layer. The dialog box then enables you to choose the resolution conversion used. This one is set to Rough, believe it or not.

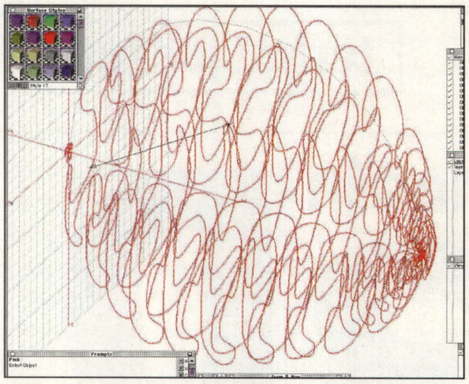


6 Once the profile is in Modeller, you can do what you want with it. Here, we extruded it (Shift+E), then put it into a background layer to act as the cutter in a Solid Drill operation (Tools tab) on the cube. This would take an age to create in *LightWave* or *Inspire*.

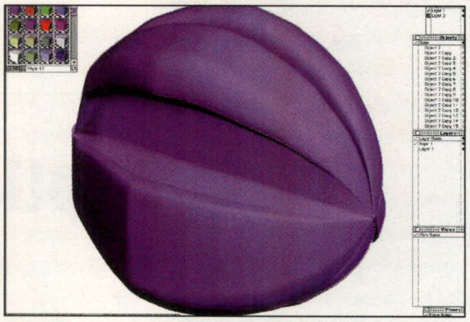


Adobe Illustrator™ Import Options
Color : Use File's Color Palette
Scale Factor : X: 50.000 Y: 50.000
Of Points Per Bezier Segment : 12
● Import As Modeling Objects :
☒ Import Bezier Segments As Separate C-Curves
☒ Maintain Grouping
☒ Position On Current Reference Plane
☒ Create Object Text From Text Elements
○ Import As Drafting Elements :
☒ Make Solid Hatch Elements From Filled Paths
Plot Scale 1 : 1.000

7 *form•Z* also has a robust *Illustrator* import function. As here, you can choose to import the curve onto the current reference plane. The Import dialog is shown at the bottom right.



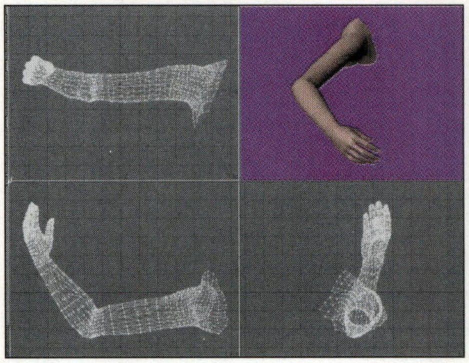
8 Once in, a spline can be lathed, swept or extruded – or as here, used to create a cage for a meshing operation. *form•Z* also enables you to use its own spline curve operators (C-Curves, or Controlled Curves) on the imported spline, for further reshaping.



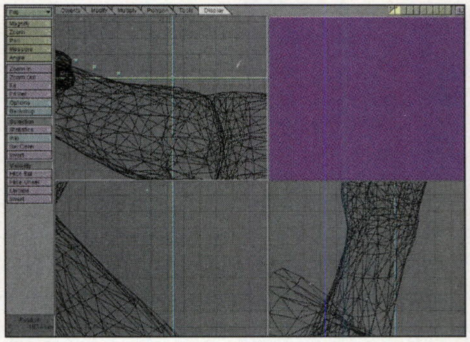
9 One advantage of using *Illustrator* curves this way in *form•Z* (apart from the ease of drawing), is that they give good results when acted upon by the C-mesh operators – they preserve their smoothing attributes. However, if they're lathed or swept, smoothing is lost and you'll get 'choppy' edges. This is the C-mesh resulting from the scaled curves in the previous frame.

Two: Spline patching

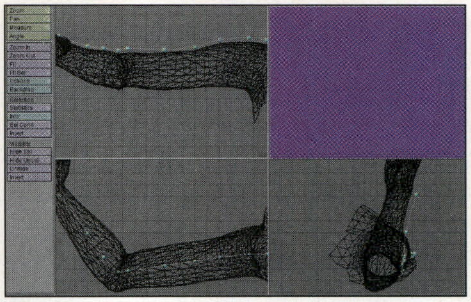
Another common use of splines is forming the outside surface or 'skin' of an object. The method we're looking at here is *LightWave*'s spline patching. Its approach to splines is different from other programs, but they are easy to use...



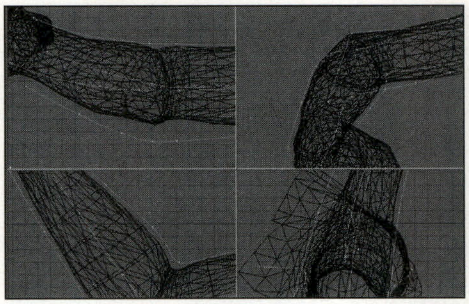
1 First off we'll start with an arm, since we'll be using spline patching to put a sleeve around it. This is from a *Poser 3* girl. It was imported into a foreground layer in *LightWave* using direct opening of the DXF File. The arm should be placed in a background layer to use as a guide.



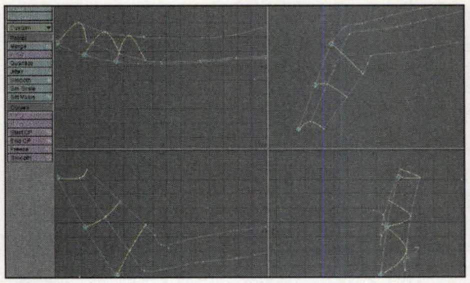
2 Splines in *LightWave* are constructed by first defining a series of points. You can do this in a number of ways. With the Points tool selected (Polygon tab), click to place a point and hit Return to make it – or you can position the crosshairs and click with the right mouse button (Control/Command-click) to instantly set the point.



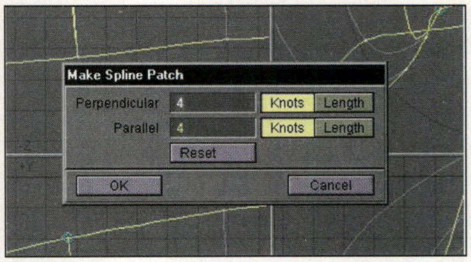
3 After you've set a series of points, you can hit Control/Command+P to make the spline. If you go back and add any points out of order, you must deselect all points, then reselect them in the order you want the spline to be formed (left-to-right, right-to-left), – *LightWave* won't automatically know in what order they should be joined. Also, all splines should contain an equal number of points – not necessary, but it makes life easier.



4 The other splines are added in the same way: a spline above and below the arm and one to the left and right should be sufficient to define the outline of your sleeve. You can do any fine tweaking at this stage with the Drag tool (Control/Command+T), which enables individual points to be moved. You'll note that even though they don't conform to the normal 'Control-Point/Handle' type of spline, they're remarkably easy to work with.



5 The next stage is to build the other set of splines that define the tube of the sleeve. These are formed by the sets of three points that run up the sleeve. Note that we're only using the three splines that form one half of the sleeve. Putting the sleeve in two halves makes things easier later on. The splines were duplicated and two sets made on different layers. Then either the upper or lower spline was deleted to make a half-sleeve. Points are selected in threes, and Control/Command+P used to make the splines.



Make Spline Patch

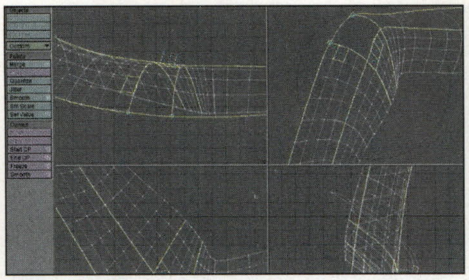
Perpendicular 4 Knots Length

Parallel 4 Knots Length

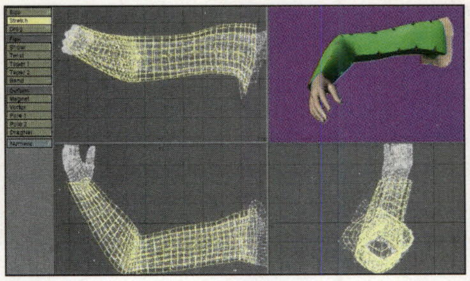
Reset

OK Cancel

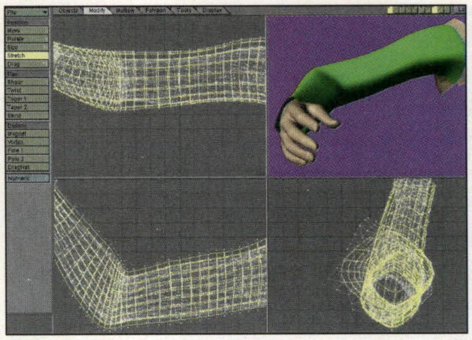
6 Once the spline cage is complete, the patching can begin. With the Selection mode set to Polygons (Control/Command+H), four adjacent sides of a patch are selected (best done in Top view here), and patched by pressing Control/Command+F. *LightWave* isn't fussy about any additional polys that may creep in when you're selecting, but it can object to the order of selection. If you get a message saying 'Curves do not Cross Properly', select them again in a different order. The Make Spline Patch dialog enables you to set the resolution of the resulting patches.



7 Each quad that makes up the sleeve must be patched individually. It's best to keep the resolution of all patches the same, since they'll be merged later on. Here, you can see the patches being added. In the top-right pane, the elbow quads have just been selected ready to be patched. Setting the Perspective display to Wireframe (press D to bring up Display options) can give you a better idea of what's going on. You'll see now why patching the complete sleeve isn't a good idea.



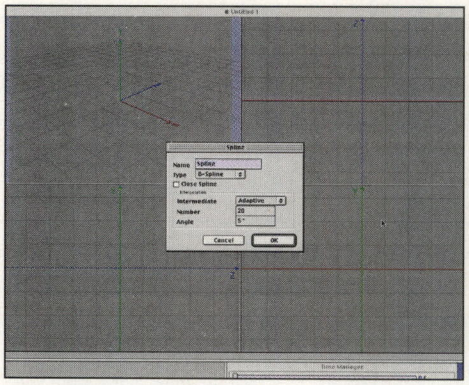
8 Once you've done the one half of the sleeve, you can put it in a background layer and patch the splines which make up the other half. Once the two halves are complete, you can paste them into the same layer. The appearance is a bit angular, but if you do a MetaNURBS operation now (press the Tab key), you'll get this strange result. This is because all the polygon patches are still individual objects, so go to the Polygon tab and press the Merge button (or press M). The upper and lower polygons will be smoothly joined.



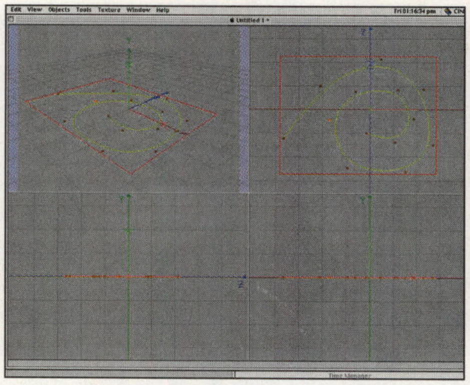
9 You may still notice an ugly seam running the length of the sleeve after merging, but a quick MetaNURBS operation produces a smooth sleeve. Hint: when patching, place the spline cage in a layer below an empty, open layer. Select both layers (use Shift), and when the polygon patches are created, they're automatically placed in the open layer.

Three: 3D splines

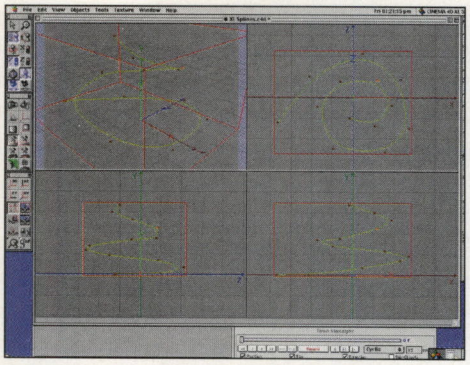
The splines we've looked at so far have all been 2D, but it's possible to use 3D splines too. Here, we'll look at how *Cinema 4D* does it (a 60-day trial of *Cinema 4D GO* is on the CD). Its implementation of spline drawing is different to 2D programs...



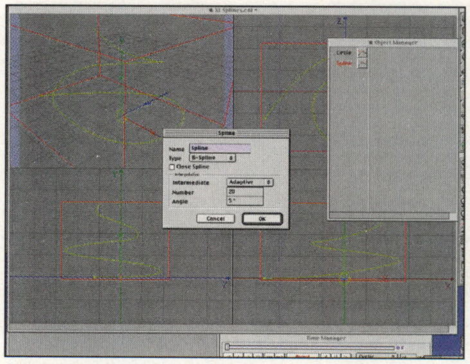
1 **In order to begin drawing splines in *Cinema*, you have to start with an empty spline – literally just a set of axes which act as the placeholder for your spline. Choose this from the Objects>Empty Spline... menu. From the resulting dialog, choose B-Spline.**



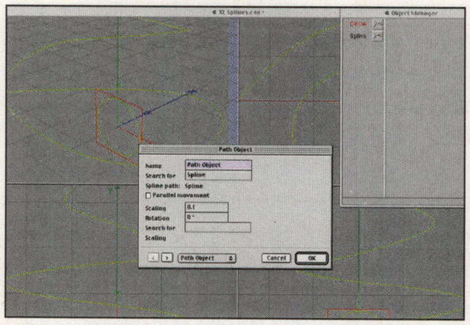
2 **Next, you add your points. This is best done in a 2D plane to begin with. Note that you must be in Point Edit Mode (choose it from the left-hand Tools palette) and hold down Control as you add the points, or they won't be added to the scene.**



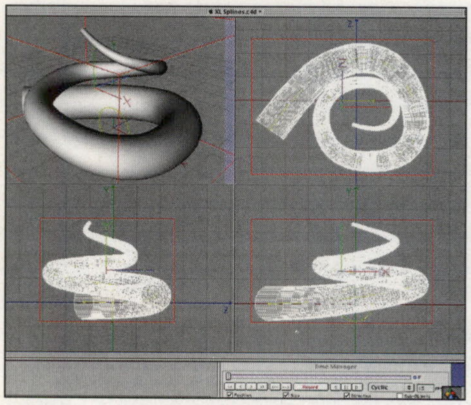
3 **Now you can do your 3D editing. You simply move the points in any direction to produce the third dimension of the curve. Here, we constrained the movement to the Y-axis only, to produce vertical movement and the resulting spiral. *Cinema 4D* has ready-made regular helices too.**



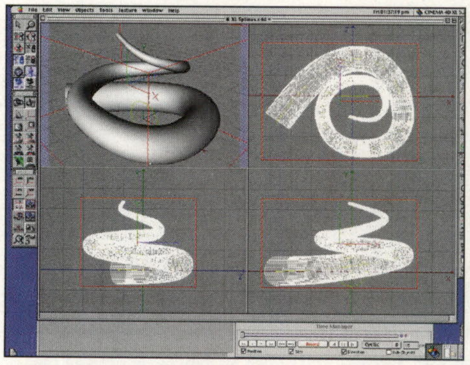
4 **Now would be a good time to see what the different types of spline do. If you double-click on the Splines icon in the Object manager, the Spline dialog reappears. You can see how the various types (B-Spline, Hermite, Akima and Linear) affect the tightness of the resulting curve.**



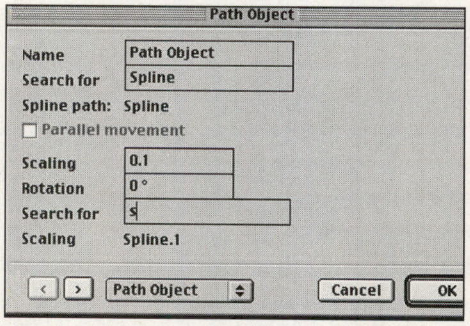
5 **The spline itself is a non-rendering object, so it's only useful as a stage towards another object. Splines are useful as sweep paths, so place another spline object to use as a source (here we've used a circle). Make sure the circle is selected and choose Objects Menu>Spline Object>Path Object... In the resulting dialog, type in the name of the spline used as a path. Leave the Scaling field blank for the moment.**



6 **Here, you can see the resulting sweep. We've added a 0.1 scaling factor for the source to produce a tapering sweep. This isn't the same result as using a scaling spline, however.**



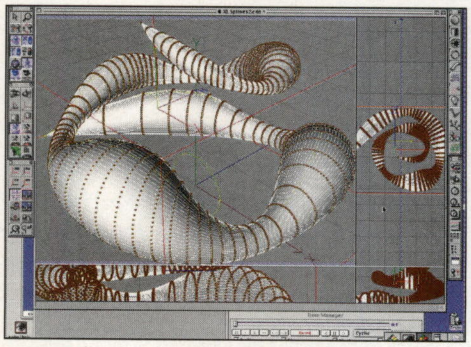
7 **It looks a mess, but it's simple really. What we've done is duplicated the original spline (by cutting and pasting, not by using the Duplicate command), then moved alternate points along its length to produce a 'hogsback' profile. This will be used as a scaling spline.**



Path Object

Name: Path Object
Search for: Spline
Spline path: Spline
☐ Parallel movement
Scaling: 0.1
Rotation: 0 °
Search for: S
Scaling: Spline.1

8 **Next, go back to the Path Object... dialog. Enter the name of the source spline in the 'Search For:' field at the top of the dialog, and the name of the scaling spline in the 'Search For:' field at the bottom of the dialog. This procedure is a direct consequence of not being able to multiple-select anything in *Cinema 4D*. This scaling isn't the same as the source scaling carried out previously.**



9 **On closing the dialog, you can see that the source has scaled uniformly along its length, but has also scaled non-uniformly according to the variations introduced in the scaling spline. This screenshot is still in Point Edit mode, so you could tweak individual points to produce further modelling here (if you were feeling masochistic enough).**

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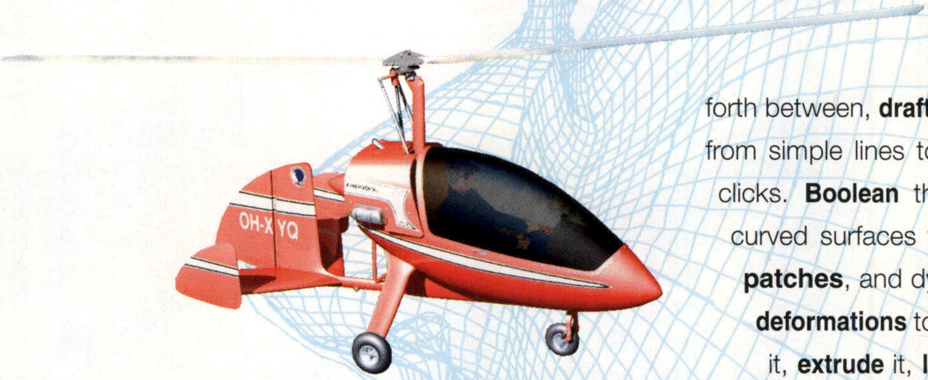

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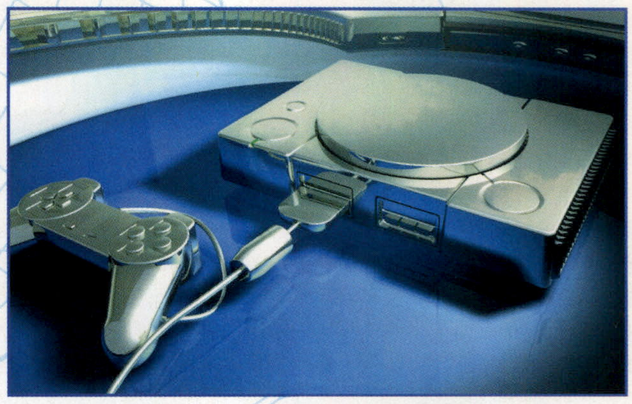

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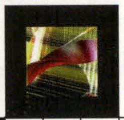


technique five

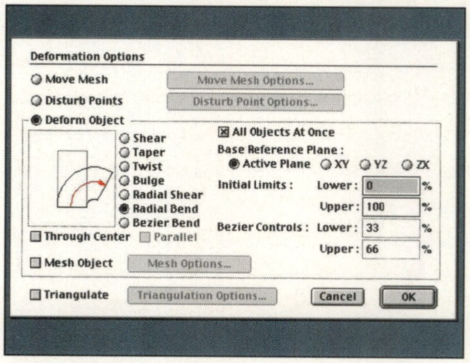
Deformations

THE FIFTH TECHNIQUE TURNS THE SPOTLIGHT ON DEFORMATIONS. THESE CAN SAVE YOU BOTH TIME AND EFFORT, BUT EACH PROGRAM HANDLES THEM DIFFERENTLY – HERE ARE THREE EXAMPLES...

⇨

One: form•Z

For our first example of how deformations work, we're going to use *form•Z* – try it with the demo of v3 on the CD...



Deformation Options

○ Move Mesh

○ Disturb Points

● Deform Object

○ Shear
○ Taper
○ Twist
○ Bulge
○ Radial Shear
● Radial Bend
○ Bezier Bend

☐ Through Center ☐ Parallel

☒ All Objects At Once

Base Reference Plane : ● Active Plane ○ XY ○ YZ ○ ZX

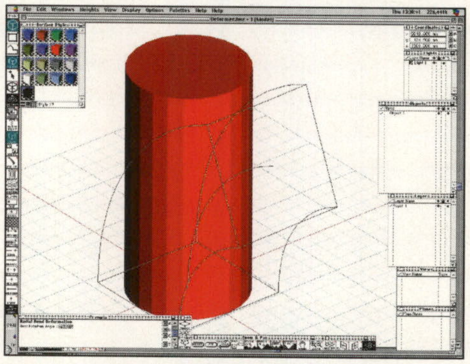
Initial Limits : Lower : 0 % Upper : 100 %

Bezier Controls : Lower : 33 % Upper : 66 %

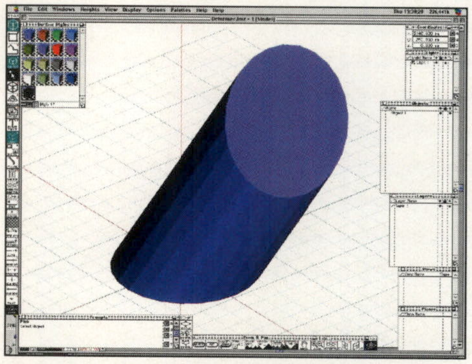
☐ Mesh Object

☐ Triangulate

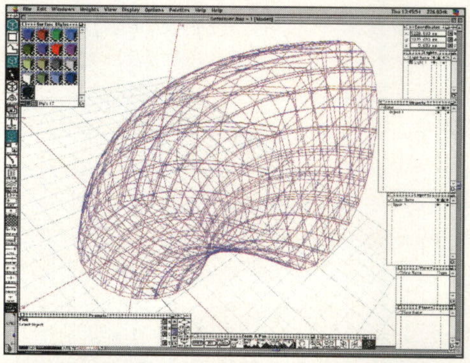
1 This is *form•Z*'s Deformation Options dialog. The bottom quadrant is where you choose the type of deformations that act on entire objects. Here, we've chosen the simple Radial Bend Deformer, which we'll apply to a cylinder.



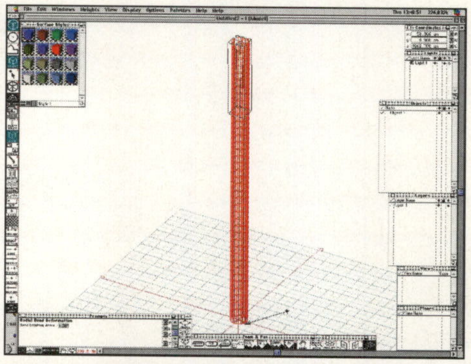
2 Click on the cylinder after closing the dialog box and you get a deformation box, which you can drag by an edge. This shows the outline of the shape you end up with. Here, you can see it bending forward. A second click sets the extent of the bend...



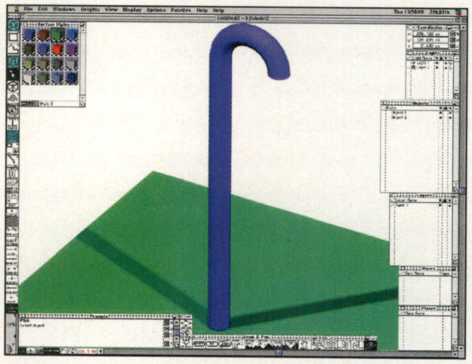
3 ... and that's not what we were expecting. The cylinder has sheared, not bent. This is because we didn't follow the golden rule: everything must be converted to a mesh before it can be deformed, or there won't be sufficient segments for a clean bend.



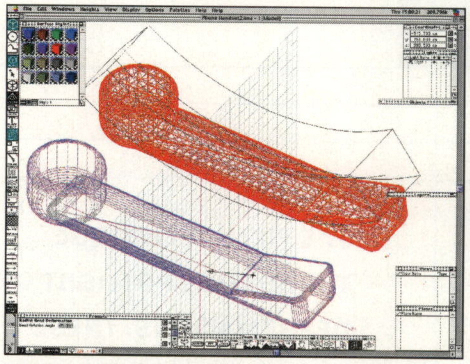
4 Here's the cylinder with the same bend applied after meshing it. Many programs use meshes as their basic object types (eg *LightWave*), but then again many others don't. This is the first thing you should consider if your deformations don't go as planned.



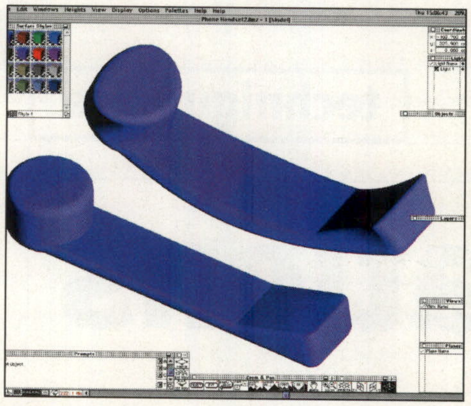
5 Here, you can see the deformation box is confined to the top quarter of our column. In *form•Z*, you can achieve this by Option-dragging one edge of the Deformation box. Other programs enable you to do this with handles on the box itself.



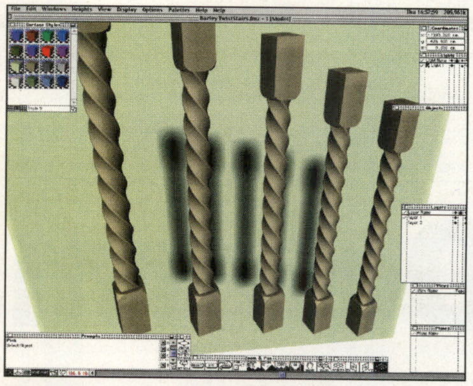
6 This is done because we want to confine the effect of the deformation. This enables us to shape the handle on this walking stick, for example. Also, we may want to define different kinds of deformations for different regions of an object.



7 Deformations save hours of modelling work. Here, a phone handset has been roughed out and the correct bevels applied – but we need to bend it into a more user-friendly shape. The important thing is the orientation of the blue grid (the working plane). *form•Z* only enables deformations of sides of the box parallel to the working plane, so you have to choose the correct reference plane for the direction of your bend.



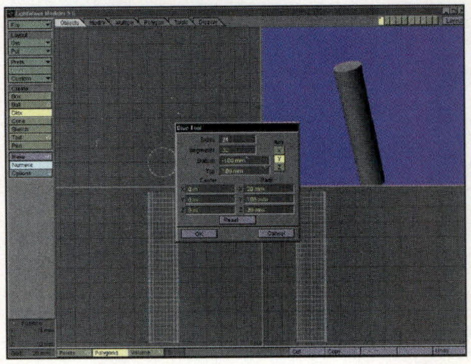
8 Here's the handset at a more advanced stage. Note that we've also applied a bulge deformation on top of the bend to give a more ergonomic profile. Generally, you can stack as many deformations on top of each other as you want, although this isn't possible with lower-end programs such as *Ray Dream Designer*.



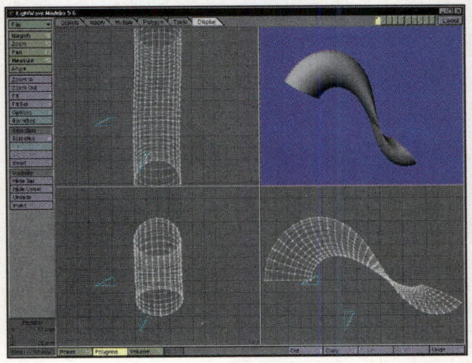
9 By choosing the correct techniques, you can save a lot of time and effort. Mesh deformations can be very processor-intensive. These Barley twist balusters were made using two methods: Twist deformation, plus sweeping and rotating a profile along a path. The deformation method takes about three times as long to complete.

Two: LightWave 3D

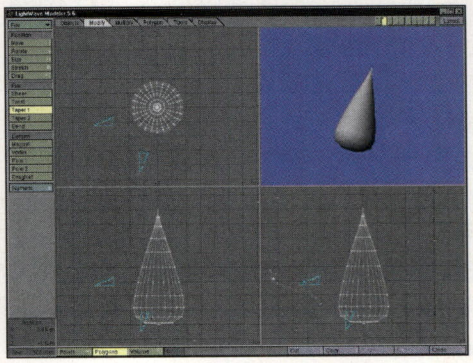
LightWave 3D has a very robust set of deformers (found under the Modify tab), but they're a little specialised for new users. We'll show you some of the fundamentals to the way *LightWave* (and *Inspire 3D*) handle these operations...



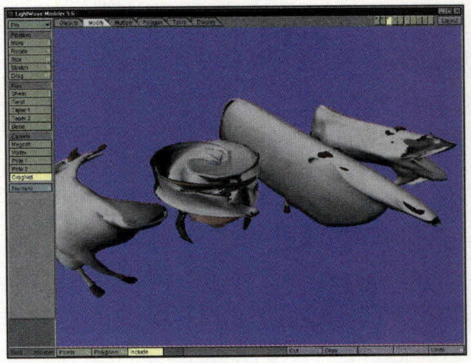
1 **In *LightWave*, we'll start with a cylinder. When you drag out the template for the disc, hit N, and this brings up the numeric requester. Here, you can enter extra segments (we've added 32), which give a fine enough mesh to enable the deformers to work.**



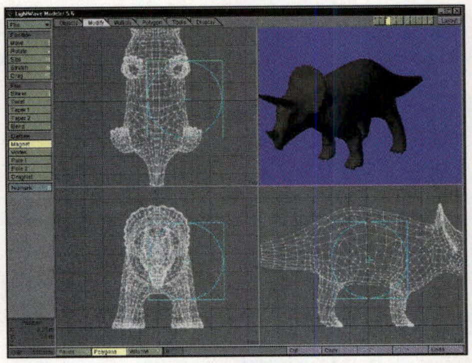
2 **Here's the Bend modifier (the cylinder is bent twice). The second bend doesn't just give more of the same type of bend – it bends the entire bent object. The bend occurs in 3D; hold Control to constrain the heading of the bend to 15-degree increments.**



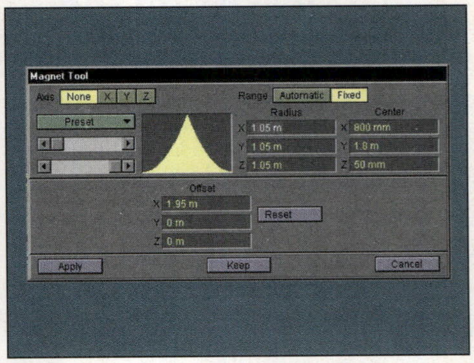
3 **Here's an example of the Taper modifier acting on a sphere. The small blue triangle is there to give you feedback about the way the effect of the modifier drops off with distance. This can be varied by hitting N when a tool is active, to bring up its requester.**



4 **It's *LightWave*, and the cow's about to get it. Here's our bovine chum subjected to other *LightWave* modifiers. From left: Twirl, Vortex, Pole 1 and Dragnet. Modifiers change, but don't add or subtract geometry. These cows have the same number of points, so can be used in multi-target morphing.**



5 **Some of the tools (Magnet, Dragnet, Pole1 and Pole2) have regions of influence. Before you can use them, you must create the regions of influence, as you would using *LW*'s Ball tool. Drag with the right mouse button (PC) or Command-drag (Mac). The region can be repositioned by dragging the central cross.**



Magnet Tool

Axis: None

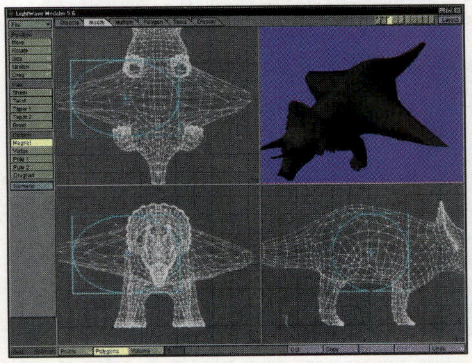
Range: Fixed

Radius X 1.05 m, Y 1.05 m, Z 1.05 m

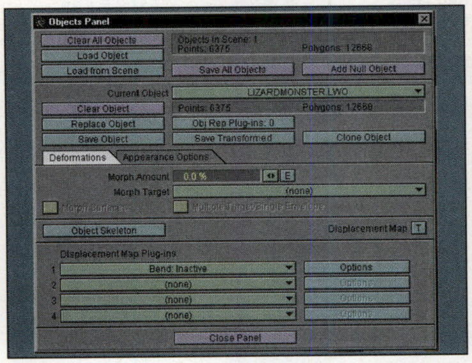
Center X 800 mm, Y 1.8 m, Z 50 mm

Offset X 1.95 m, Y 0 m, Z 0 m

6 **The yellow cone represents how the region of influence of the Magnet tool drops off with distance. It's altered by using the sliders. You can also numerically fine-tune the region of influence using the fields.**



7 **Here, you can see the effect of different fall-offs on the side of the dinosaur. The left-hand distorted region has a much sharper profile than that on the right. This is an extreme example, and the Magnet tool is better suited to fine-tuning patches of points that would be tricky to do individually.**



Objects Panel

Objects in Scene: 1
Points: 6375 Polygons: 12668

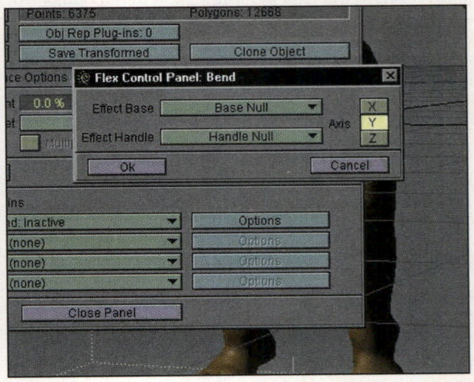
Current Object: LIZARDMONSTER.LWO
Points: 6375 Polygons: 12668

Obj Rep Plug-ins: 0

Morph Amount: 0.0 %
Morph Target: (none)

Displacement Map Plug-ins
1 Bend: Inactive
2 (none)
3 (none)
4 (none)

8 **In *LightWave 5.5*, deformations can now be used in Layout, which saves a lot of to-ing and fro-ing. Here, we've loaded the Lizardmonster object. Then, using the Objects panel, we've assigned the animal a bend deformation from the Displacement Map plug-in drop-down at the bottom left.**



Flex Control Panel: Bend

Effect Base: Base Null

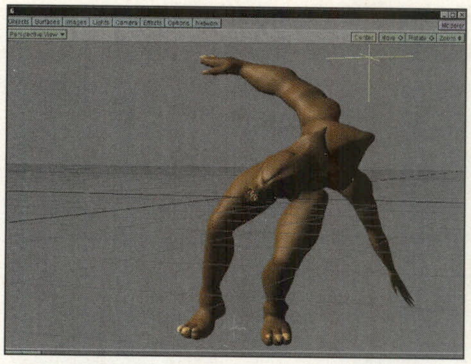
Effect Handle: Handle Null

Axis: Y

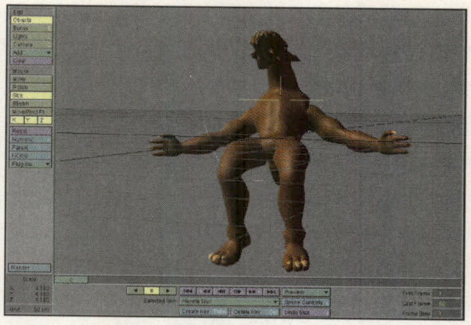
9 **Before we can use the Bend deformer, we need to add control handles: you do this by adding null objects to the scene. The Bend deformer needs two of these: a base and a handle. The relative distances of these objects determines the effect of the deformer.**

⇒

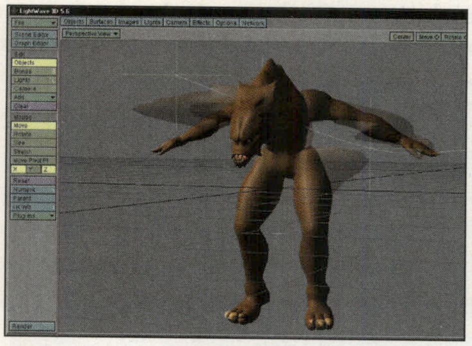
Two: continued...



10 Here's the deformer in action. We placed the base null at his feet and the handle at head level. By moving the handle null, we can now bend the entire length of the monster's body.



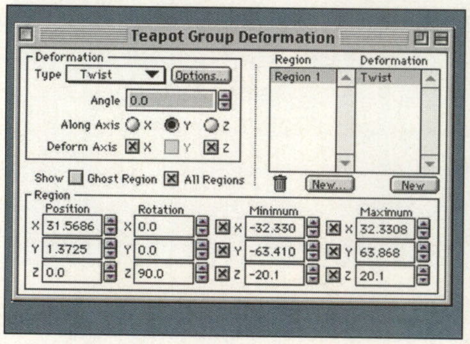
11 The relative distances of the nulls is important. Here, we've made him bend over backwards by moving the base nulls up to knee level. Now any part below the base null won't be affected. Hip and elbow joints could also be constructed by placing closely-spaced nulls in this area.



12 Finally, we've used the Vortex deformer (it needs two nulls as well), but animated it moving through our friend above, to produce a 'spacewarp' effect. You can also stack deformers in *LightWave* to produce layered effects.

Three: Electric Image

Electric Image is a powerful animation package. It has a deformer system similar to *form•Z*, but it's more user-friendly...



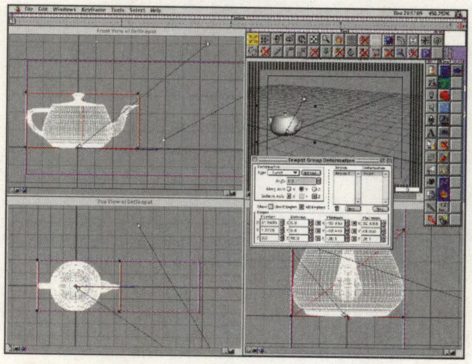
Teapot Group Deformation

Deformation
Type: Twist
Angle: 0.0
Along Axis ○ X ● Y ○ Z
Deform Axis ☒ X ☐ Y ☒ Z
Show ☐ Ghost Region ☒ All Regions

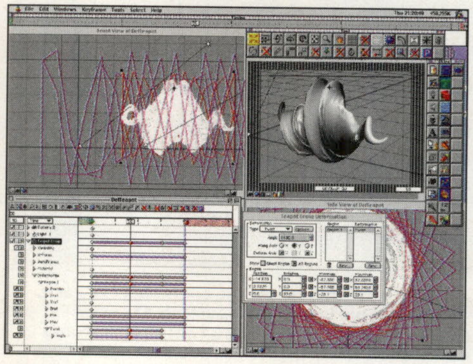
Region: Region 1
Deformation: Twist

Region
Position: X 31.5686, Y 1.3725, Z 0.0
Rotation: X 0.0, Y 0.0, Z 90.0
Minimum: ☒ X -32.330, ☒ Y -63.410, ☒ Z -20.1
Maximum: ☒ X 32.3308, ☒ Y 63.868, ☒ Z 20.1

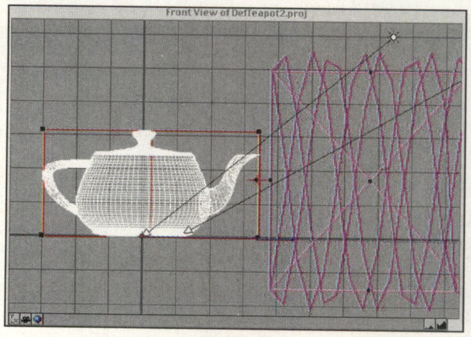
1 Start with an object (we chose a teapot) and assign it a Deformation Region (a bounding box that defines the region over which the deformation can occur). Assign the type of deformation to the region: we chose Twist, starting with an angle of 0-degrees.



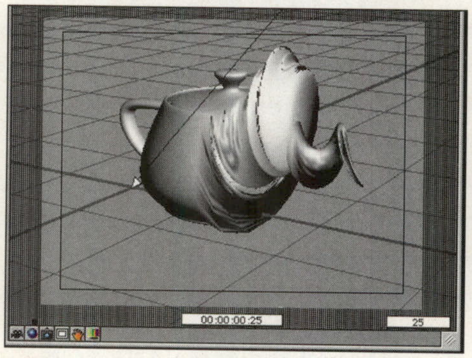
2 The pink region is our bounding box. We've given the teapot a motion across the screen for four seconds. We're at frame zero, and there's no twisting yet. This is what we're going to animate.



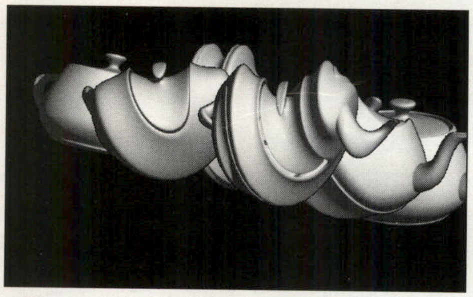
3 This is half-way through the motion, with Twist at a max 1440-degrees. The deformation region can be twisted by grabbing its handles and dragging, or by numeric input in the Group Deformation window.



4 Another good trick is to set the deformation to a maximum value for the length of the animation, but move the teapot in and out of the Deformation Region. Here, you can see the teapot at frame zero before it enters the region.



5 And here it is entering the Deformation Region, seen in the Preview Camera window. Great for those 'being-sucked-down-a-plug-hole' types of scenes.



6 This montage shows the various stages of the animated twist. *Electric Image*'s superb rendering engine almost completely eliminates rendering errors usually associated with deformed meshes. It's a good idea to triple meshes before deformations to avoid glitches in the rendering process, caused by non-planar polygons. ca>s

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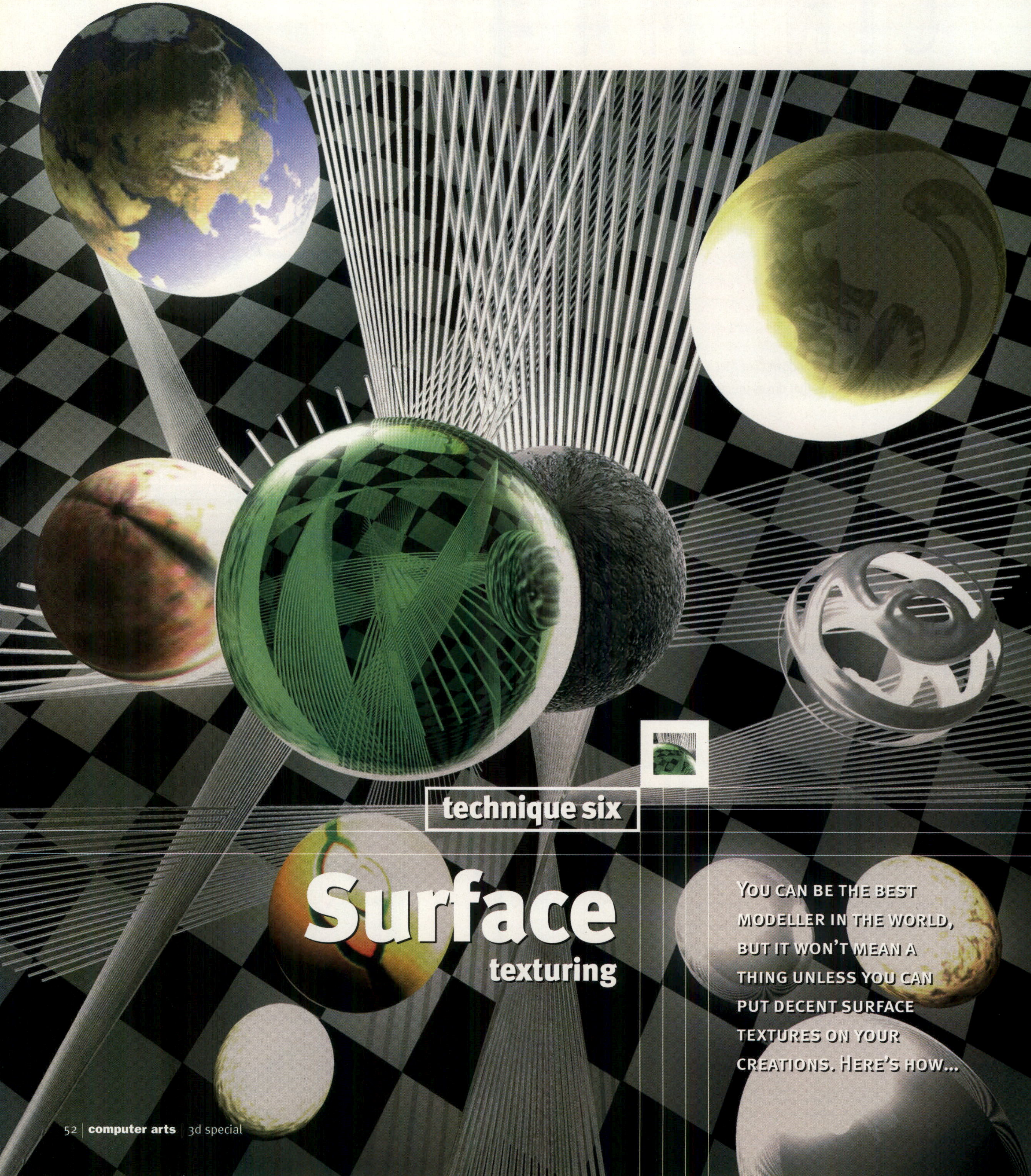


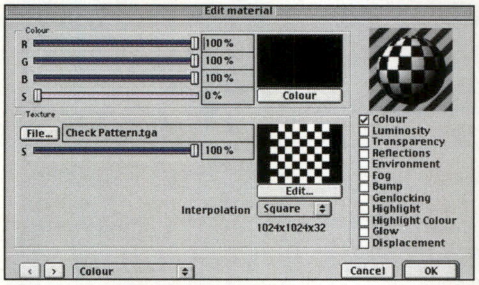
technique six

Surface texturing

YOU CAN BE THE BEST MODELLER IN THE WORLD, BUT IT WON'T MEAN A THING UNLESS YOU CAN PUT DECENT SURFACE TEXTURES ON YOUR CREATIONS. HERE'S HOW...

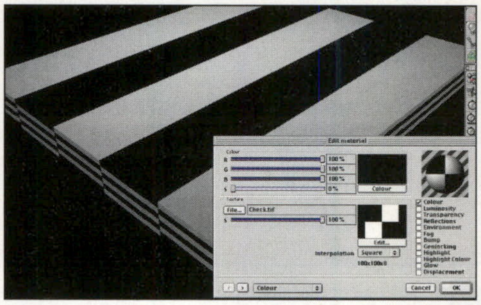
One: Creating surface textures

We'll kick off with a floor object which we're going to texture. We're using *Cinema 4D XL* (the demo is included on the CD). However, as with all the 3D techniques, you can use any 3D program on any platform...

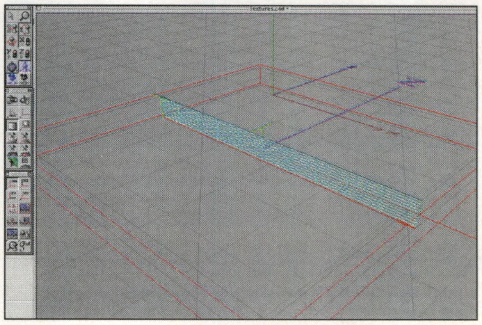


Edit material
Colour
R 100 %
G 100 %
B 100 %
S 0 %
Texture
Check Pattern.tga
S 100 %
Interpolation Square
1024x1024x32
☑ Colour
☐ Luminosity
☐ Transparency
☐ Reflections
☐ Environment
☐ Fog
☐ Bump
☐ Genlocking
☐ Highlight
☐ Highlight Colour
☐ Glow
☐ Displacement
Colour

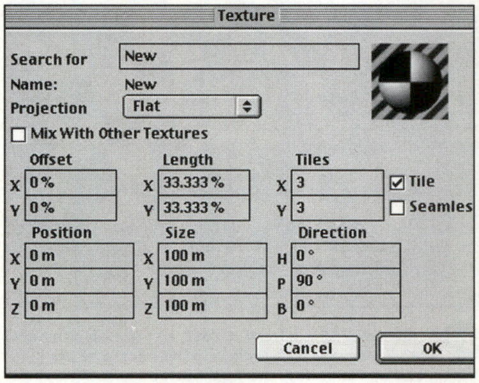
1 **This is the Material Dialog in *Cinema 4D XL* (Texture/Surface/Material are all used interchangeably in 3D to describe an object's appearance). First, put a tick in the Colour checkbox. This tells the program we're loading something in to the Colour Channel. For each different surface attribute such as colour, shininess and so on, there's always at least one channel. Since we want a chequered floor we'll load a chequered bitmap, painted in *Photoshop* (press the File... button and navigate to it).**



2 **Once the chequered bitmap is loaded, close the dialog and assign the new texture to the floor object. In *C4D* this is done by dragging the Material icon onto the object name in the Objects palette. A dialog opens, requesting information about how you want the texture positioned. For the moment, just choose 'Planar' from the list and close it. Render and... hang on, that's not what we want! The chequered pattern appears down one edge, rather than on the face.**



3 **If you click on the Texture icon in *C4D*'s Tool palette, it shows you the texture's orientation. The green mesh represents our texture map. In this case our square chequered pattern is being squeezed on to the Z-face of the floor cube. All programs have a default orientation for placing Planar textures. *C4D* tries to place textures on the Z-face of any object – but we want our texture to sit on the Y-face (pointing skywards).**

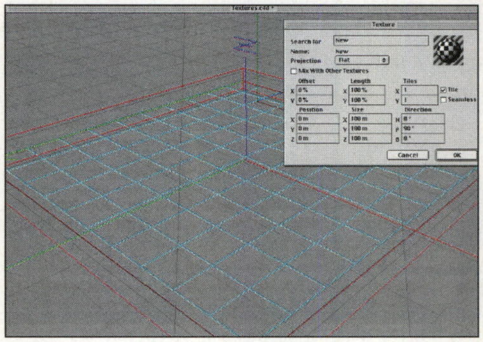


Texture
Search for New
Name: New
Projection Flat
☐ Mix With Other Textures

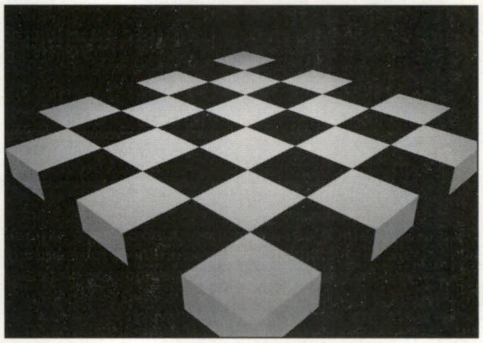
	Offset		Length		Tiles	
X	0 %	X	33.333 %	X	3	☑ Tile
Y	0 %	Y	33.333 %	Y	3	☐ Seamles

	Position		Size		Direction
X	0 m	X	100 m	H	0 °
Y	0 m	Y	100 m	P	90 °
Z	0 m	Z	100 m	B	0 °

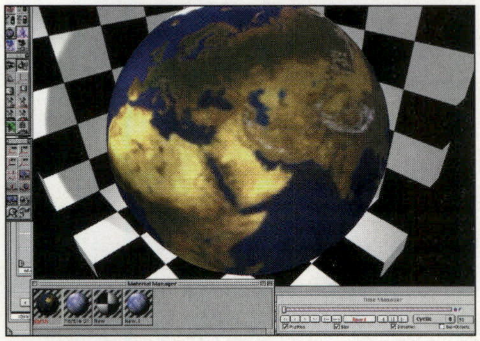
4 **We need to rotate the orientation of the texture. This is done through the Texture dialog (double-click on the Texture's icon in the Object Manager). Find the three fields labelled H, P and B (Heading, Pitch and Bank) and enter 90 in the P field.**



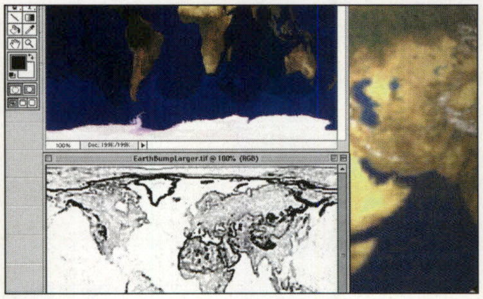
5 **Close the dialog, and you'll see the green mesh now oriented on the face of the floor. *Cinema 4D XL* doesn't enable you to rotate the textures live in the editor, although the SE version does. So, you'll just have to manipulate the texture grid as for any other object. Note that this green mesh represents how our bitmap is stretched over the object. Here, there's a 1:1 mapping.**



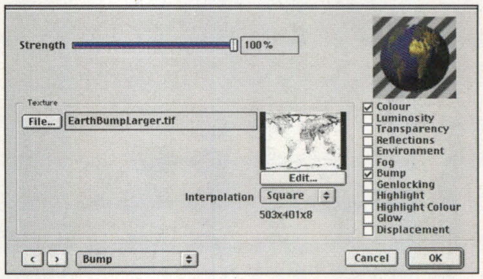
6 **Render again, and you'll see that the texture is placed properly and looks like a real floor. Orientation and mapping type is vitally important to achieve effective results. Try turning the Tiling option on from within the Texture dialog, and see what results you get. Also, experiment with scaling the texture mesh and see what results it has on your renders.**



7 **Next, we took our floor and duplicated and arranged them to create a pair of walls. Then, using the Perfect Sphere tool, we created a globe and a new blank material. Next, we loaded a bitmap of the Earth's surface Into this new material's Colour channel. This time we chose spherical mapping to make sure the image wrapped around the sphere properly.**



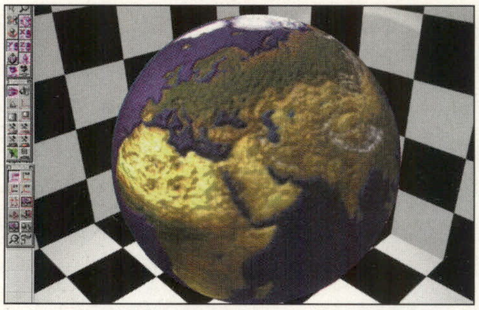
8 **As well as being used to 'paint' images onto the surface of objects, bitmap images also have other functions in creating surfaces. Here, we're going to make a copy of the Earth map and use it as a bump map. For these types of operations, the texture map must be converted to greyscale in a paint program (here it's *Photoshop*). After some messing around with the Levels, Brightness and Contrast controls, we achieved the above greyscale image.**



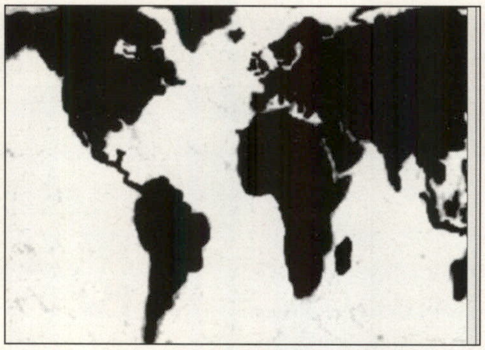
Strength 100 %
Texture
EarthBumpLarger.tif
Interpolation Square
503x401x8
☑ Colour
☐ Luminosity
☐ Transparency
☐ Reflections
☐ Environment
☐ Fog
☑ Bump
☐ Genlocking
☐ Highlight
☐ Highlight Colour
☐ Glow
☐ Displacement
Bump

9 **Now we need to place the greyscale image (the bump map) into the Bump channel of the Earth material. Double-click on the Earth material in the Materials Manager window, and tick the Bump checkbox in the resulting Edit Material dialog. Then choose the Bump page of the dialog (from the drop-down menu on Mac, and from the Tab in Windows), and click on the File... button. Navigate to the greyscale Earth bump map to load it, and then adjust the slider and see the preview bump height vary. Close the dialog box.** ⇒

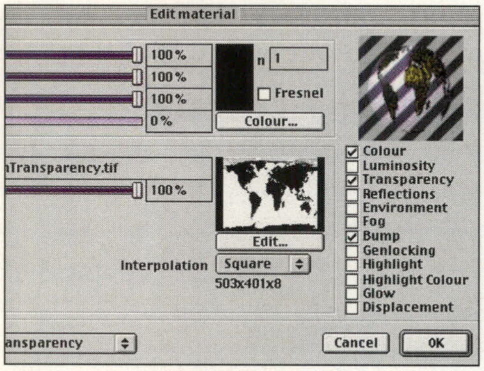
One: continued...



10 Now, when you do a render you'll see lumps on the globe corresponding to lighter areas on the bump map. The trick here is that the bump and colour maps are exactly the same size and orientation on the globe, so bump and colour information coincide. Generally with bump maps, the lighter an area is the more it's 'bumped' – so white areas in a bump map are the highest, black areas the lowest. Also, the bump height was set to 400% by typing in the value, rather than using the slider.



11 The use of greyscale information to control aspects of a surface's appearance is a very general one in texture mapping. Here, we'll use greyscale information to vary the transparency on the globe's surface. Again, take the bump map and copy it, then paint in all the land in black. We can then apply a slight Gaussian blur to soften the edges, since it was a low-resolution map.



Edit material

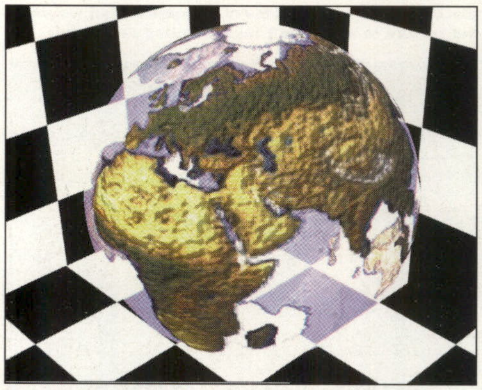
100 %
100 %
100 %
0 %
n 1
☐ Fresnel
Colour...

ıTransparency.tif
100 %
Edit...
Interpolation Square
503x401x8

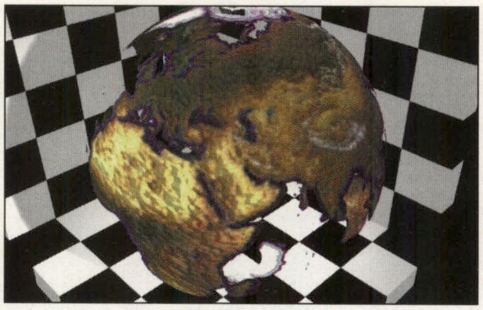
☑ Colour
☐ Luminosity
☑ Transparency
☐ Reflections
☐ Environment
☐ Fog
☑ Bump
☐ Genlocking
☐ Highlight
☐ Highlight Colour
☐ Glow
☐ Displacement

ansparency
Cancel
OK

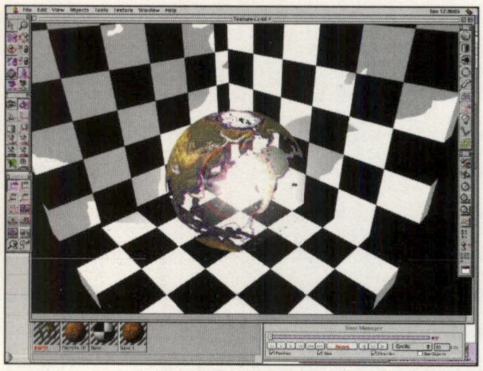
12 As for the bump map, we click in the Transparency checkbox and go to the Transparency page of the dialog. The transparency map file is loaded into the Transparency channel, and the 'S' (Strength) slider set right down. You can vary the strength of the file map itself between 0-100% to vary the strength of the overall effect.



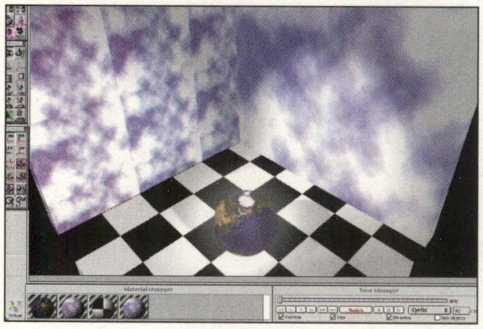
13 You can see the results here after rendering. The areas that were white are transparent, the black areas are opaque. Any intermediate-grey areas will be translucent. Note, however, that the transparent areas are not completely see-through. This is a limitation of the way *C4D XL* handles its own internal alpha channels.



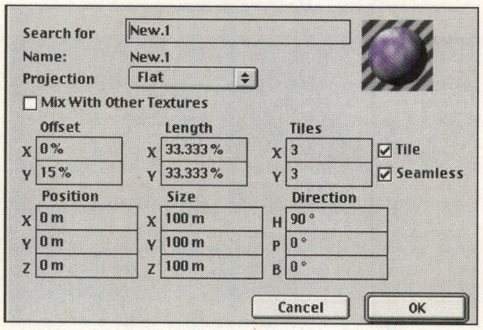
14 There is a similar effects channel (called Genlock), and this can be controlled by greyscale information as well. If we load the same transparency map into the Genlock channel and render, (there's nothing to stop us using one map for as many channels as we like), the transparent areas are now completely knocked out of the surface. The difference between transparency and Genlocking is that Genlocking is 'all or nothing' – you don't get any intermediate translucency as with transparency mapping.



15 Genlocking is a 'real' effect, as you can see here. We've placed a lightsource in the centre of the Earth, and on rendering, the lightsource casts shadows according to the transparent/opaque areas on the globe's surface. This makes Genlocking particularly suitable for complex perforated surfaces that would be difficult to model by hand.



16 The maps we've used up to now have all had 1:1 mapping: they completely cover the surface they're mapped onto. Sometimes this isn't an option, as this example shows. On the right-hand wall the mapping is 1:1, but since the original texture map was small (256x256 pixels), the renderer has stretched it to fit the surface (effectively blowing it up). This has resulted in coarsening and pixellation of the image map. The left-hand wall shows what happens when textures are tiled.

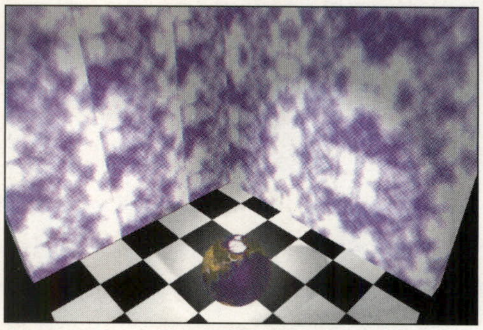


Search for New.1
Name: New.1
Projection Flat
☐ Mix With Other Textures

Offset X 0%
Offset Y 15%
Length X 33.333 %
Length Y 33.333 %
Tiles X 3
Tiles Y 3
☑ Tile
☑ Seamless
Position X 0 m
Position Y 0 m
Position Z 0 m
Size X 100 m
Size Y 100 m
Size Z 100 m
Direction H 90 °
Direction P 0 °
Direction B 0 °

Cancel
OK

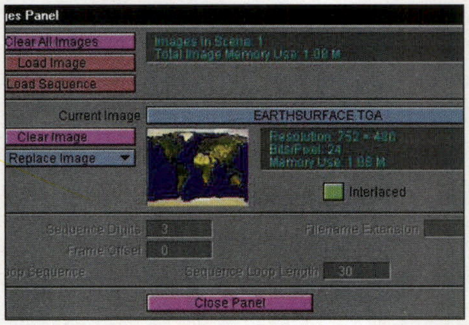
17 Double-clicking on the Texture icon in the Object Manager brings up the texture dialog, and gives you the option to tile the texture (make it repeat a specific number of times across a surface). Here, we've chosen 3x3 tiles – but as you can see from the previous example, the seams between the tiles are very evident. This is always a problem with non-repeating textures, but there is sometimes a way out. We've also checked the 'Seamless' checkbox, telling *C4D* to tile without seams.



18 Here, the right-hand wall has been tiled seamlessly, but there are obvious symmetrical repeating patterns over the surface which look unnatural. This is a limitation of the technique, and sometimes the only way out of this is to increase the size of the image map in a program like *Photoshop*, by using the Clone tool. As you get more experience, you'll know instinctively which types of patterns can be tiled and which will need specific treatment.

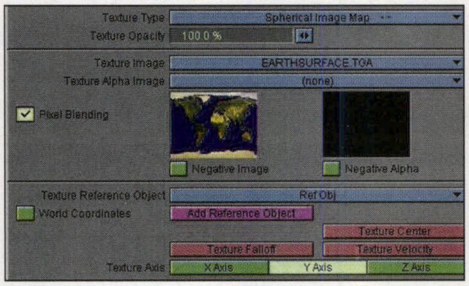
Two: More surface textures

Next, we'll see how *Inspire 3D* assigns and handles surfaces (its method is unusual in comparison to other 3D packages). However, you can use any 3D package to try out this technique...

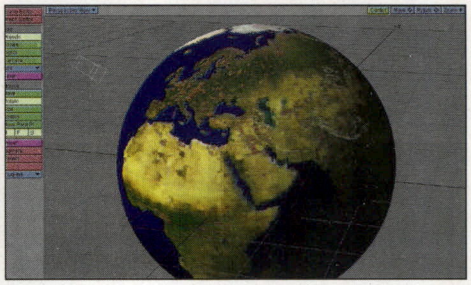

es Panel

Images In Scene: 1
Total Image Memory Use: 1.08 M
Current Image: EARTHSURFACE.TGA
Resolution: 752 × 480
Bits/Pixel: 24
Memory Use: 1.08 M
Sequence Digits: 3
Frame Offset: 0
Sequence Loop Length: 30

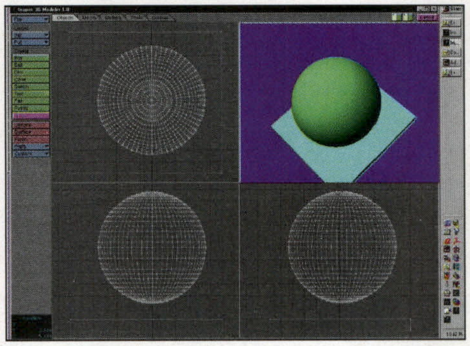
1 The first step is to create a ball to be our globe in Modeller, and then open it in the Layout portion of *Inspire* (use the Put command from the Modeller's Objects tab). Layout is where all texture mapping and animation is done. Load an image into Layout using the Images panel. Click on the 'Load Image' button and navigate to the Earth map. We're keeping the same theme going here.


Texture Type: Spherical Image Map
Texture Opacity: 100.0 %
Texture Image: EARTHSURFACE.TGA
Texture Alpha Image: (none)
☑ Pixel Blending
Texture Reference Object: Ref Obj

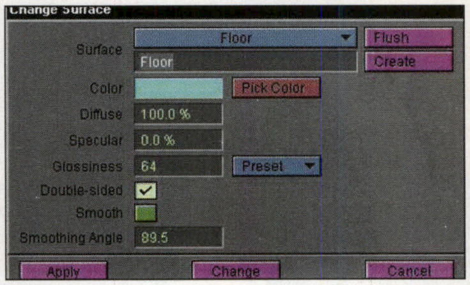
2 The next step is to add the image to the Sphere object. Click on the Surfaces button to bring up the Surfaces panel, then hit the 'T' button next to the Color Texture button. This brings up the Color Texture panel where you can choose the already-loaded Earth surface bitmap from the Texture Image drop-down menu. The next thing to do is to hit the Add Reference object button. You should see the words 'Ref Obj' appear in the 'Texture Reference Object' drop-down. Hit 'Use Texture', then close the Surfaces panel.



3 If you have 'Enable OpenGL Textures' selected from the Options panel, you should see the image mapped onto the globe right there in Layout. The Texture Reference object that you defined earlier on in the Color Texture panel now comes into its own. This will act as a handle to the texture map, so choose it from the Selected Item drop-down menu at the bottom of the screen. You can now use the Move, Rotate and Scale tools to manipulate the surface texture, and see the changes update in real-time.

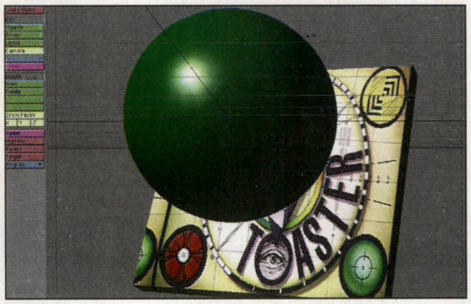


4 The way *Inspire* (and *LightWave*) handle naming objects and layers is not entirely conventional, but it's vital for correct surfacing. In this simple model we have a sphere and a slab, both on different layers in the Modeller. Before we take them into Layout for surfacing, we'll have to make sure that each object has a unique surface name assigned to it.

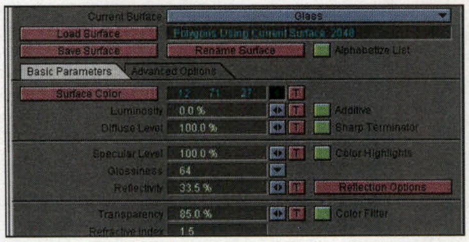

Change Surface

Surface: Floor
Floor
Diffuse: 100.0 %
Specular: 0.0 %
Glossiness: 64
Double-sided ☑
Smooth ☐
Smoothing Angle: 89.5

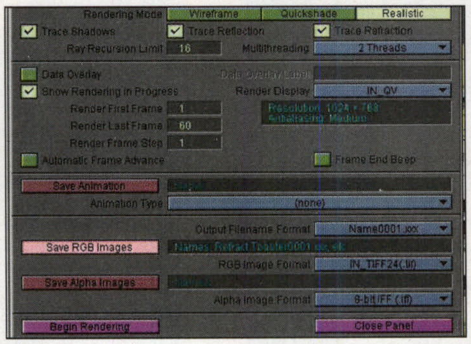
5 Clicking on the Surface button (or pressing Q) brings up the Change Surface panel. When you start, there's just one surface named in the drop-down menu: Default. All models have this standard surface. Type in a new name for the surface, and hit the Pick Colour button. Choose a colour from the standard Colour Picker (Mac or Windows) that emerges and click Create. This adds a new surface to the drop-down list. Clicking 'Apply' applies the new surface name to whatever is in the current foreground layer.



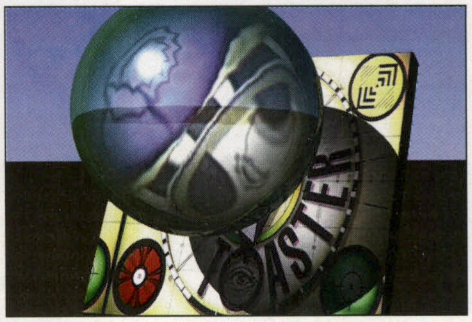
6 Here's the model in Layout. It comes in as a single object, but will be composed of two surfaces (one's called Floor and the other Glass). We can assign textures and so on to each surface individually. Here, we've mapped the 'Video Toaster' logo onto the floor slab in the same way as for the Earth Surface texture map. The OpenGL live texture mapping helps enormously in visualisation. The Sphere has been assigned a glass surface.


Current Surface: Glass
Polygons Using Current Surface: 2048
Surface Color: 12 71 27
Luminosity: 0.0 %
Diffuse Level: 100.0 %
Specular Level: 100.0 %
Glossiness: 64
Reflectivity: 33.5 %
Transparency: 85.0 %
Refractive Index: 1.5

7 Now we've got to cook up some glass. The colour of glass generally leans towards no colour at all, so should be set to a very dark shade of the glass's inherent colour (here, a very dark green – almost black). Diffuse and specular should be set very high (90-100%), but Reflectivity is generally not high – around 25-35%. Equally, Transparency should be around 80-90%. Real glass has many imperfections, and the material's density absorbs some light itself. Finally, Refractive Index: a rule of thumb is 1.5, but if you want real accuracy, you can enter actual values for specific glass types.


Rendering Mode: Realistic
☑ Trace Shadows
☑ Trace Reflection
☑ Trace Refraction
Ray Recursion Limit: 16
Multithreading: 2 Threads
☑ Show Rendering in Progress
Render Display: IN_QV
Resolution: 1024 × 768
Antialiasing: Medium
Render First Frame: 1
Render Last Frame: 60
Render Frame Step: 1
Animation Type: (none)
Output Filename Format: Name0001.xxx
RGB Image Format: IN_TIFF24(.tif)
Alpha Image Format: 8-bit IFF (.iff)

8 The size of the final render and anti-aliasing parameters can all be set from the Camera panel. When that's done, you can finally set the rendering parameters. First and foremost, make sure that Realistic is the rendering mode, and that 'Trace Shadows' 'Trace Reflections' and 'Trace Refraction' are turned on – or your final render will be a washout.



9 Here's the final render, with convincing glass. The background is a standard procedural backdrop chosen from the Effects panel. From Advanced Options in the Render panel, the Opaque button was selected for the 'Edge Transparency' Parameter. This mimics the effect of total internal reflection at the edges of the glass ball without having to calculate it, which can be time-consuming. ca-s

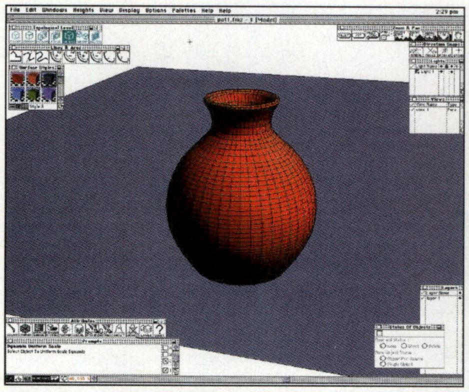
technique seven

Lighting

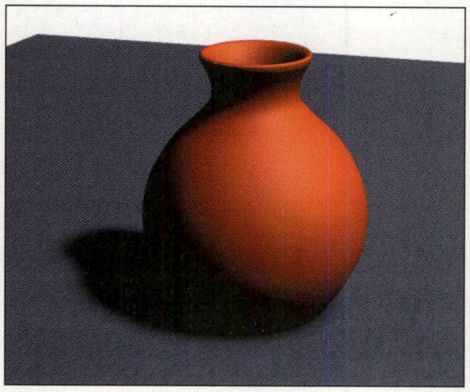
LIGHTING IS CRUCIAL TO ANY PIECE OF 3D ART. HERE, WE SHARE TOP TIPS THAT CAN HELP YOU AVOID COMMON LIGHTING PITFALLS. YOU CAN TRY THEM OUT THEM USING ANY 3D PACKAGE...

Stage one: Lighting – creating a good generic starting point

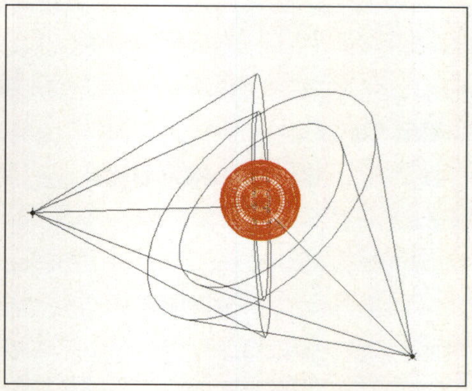
This lighting set-up looks good in most scenes without much tweaking, and is far better than the default lighting most packages use. You can do this in any 3D program – we've used *form•Z*, and you can find the demo on the CD…



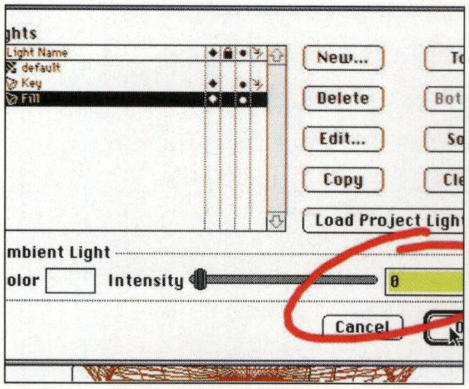
1 Create a simple scene with a single main subject on a flat plane. Here's a lathed pot done in *form•Z*. It has a simple rough surface to help break up the light. The ground plane is a slate grey slab.



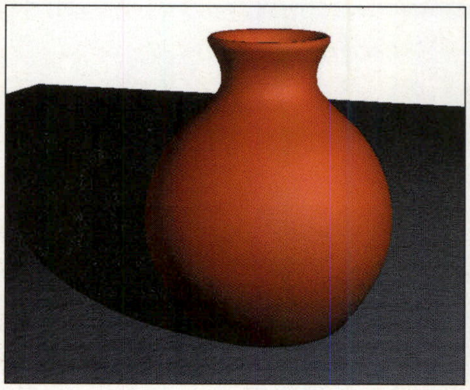
2 First, let's see what this looks like with the default 45-degree parallel light, and the 15% ambient light that we have. The results are very flat – it's difficult to see the form of the subject.



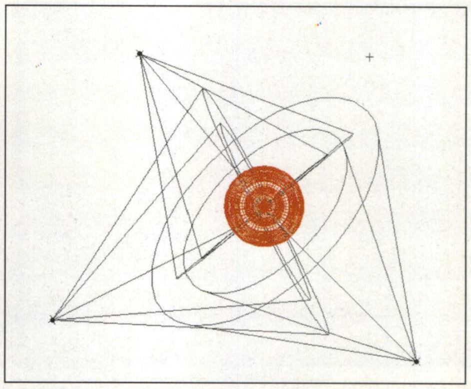
3 Lose the parallel light and replace it with a spot aimed at your subject, picking out an area of interest – this is the 'key' light. Add another spot on the other side to add fill, with intensity about 30%.



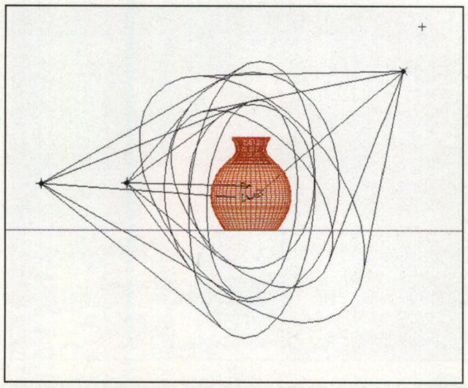
4 Most importantly, kill the ambient light. This stuff looks highly unrealistic and tends to make scenes look really flat as it has no origin. More fill lights are preferable to any amount of ambient light.



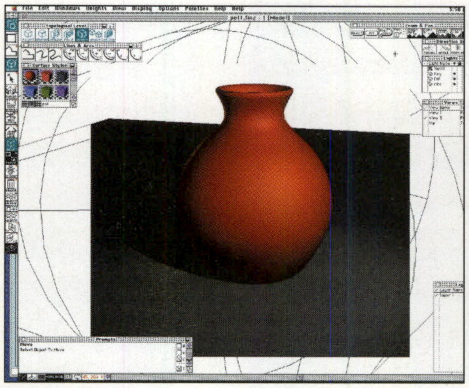
5 A quick render shows things improving slightly. However, it's still very dark and uninteresting. Boosting the key to 110% helps a bit, but we need another light. Notice that the fill light has no shadows.



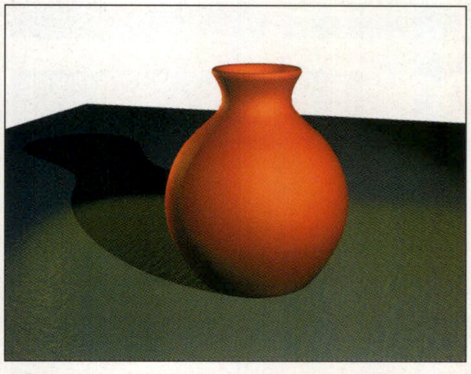
6 Adding a strong 'rim' light behind the subject helps it to stand out from its environment. Try to position this light so that it only illuminates the edge of the subject, defining its form. Add colour for interest.



7 The Front view shows that the fill and rim lights have a fairly low angle. This is to help illuminate the darker areas of the subject opposite the key light. Shadows are unnecessary on the rim light here.



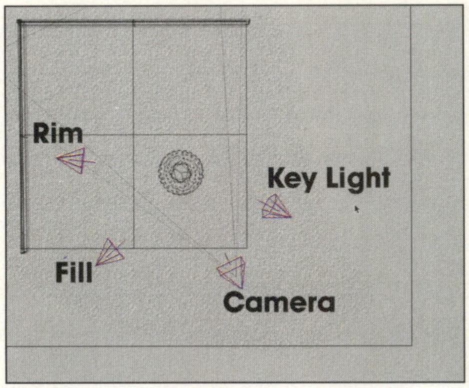
8 A test shows things looking much more acceptable, but still not quite there yet. Moving the rim light a little and boosting the intensity to a really high value (around 170%) should do the trick.



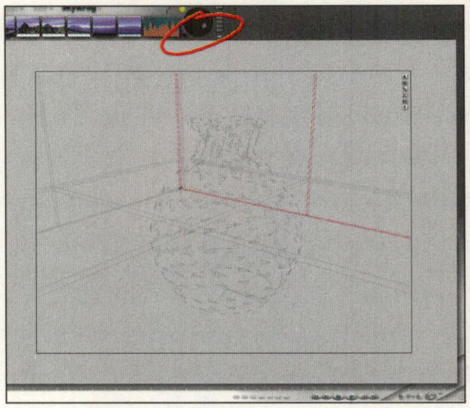
9 The final render shows the form of the object much more effectively than the default lighting. This simple three-light method works well for a lot of situations, and makes a good starting point for more adventurous techniques.

Stage two: Enhancing the basic lighting

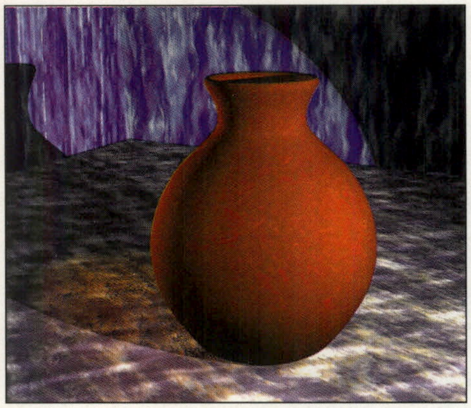
One of the easiest and most effective ways of enhancing lighting is to break it up so it casts interesting shadows over the forms in your scene. You can use any 3D software to do this – we've used *Bryce 3D*, and the demo's on the CD...



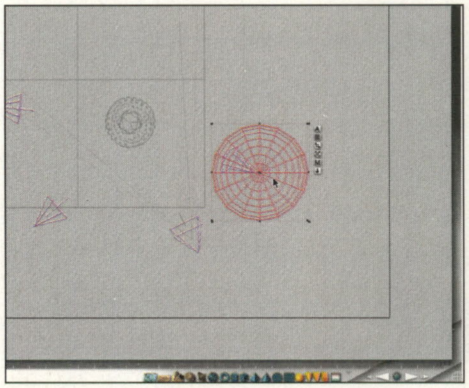
1 Initially, the lighting is set up as before (this time using *Bryce 3D*). A back wall is added for interest. *Bryce*'s atmospheric effects are switched off so they don't interfere with the custom lighting.



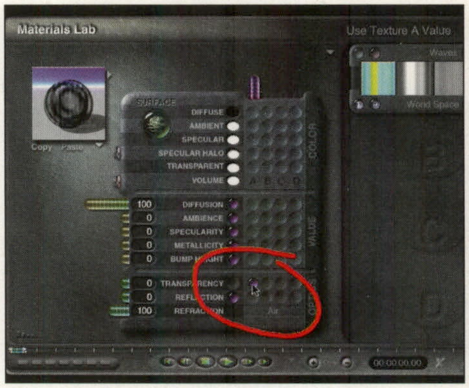
2 It's important to turn off the Sun in *Bryce* as we only want to see the effect of our three spotlights. To do this, just set its colour to black.



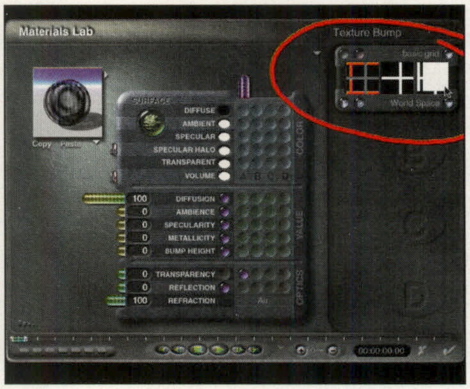
3 To break up the shadows from the key light, we need to make it shine through a stencil or 'gobo'. Here's a render of the scene before the stencil.



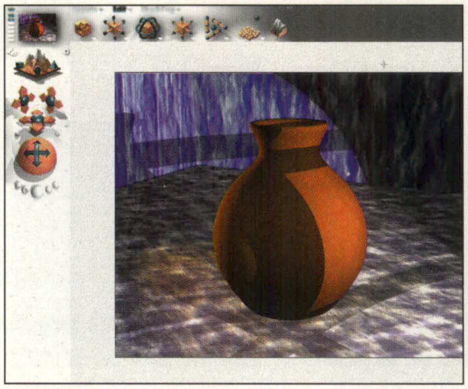
4 The stencil simulates the effect of the light streaming through a window or past the leaves on a tree, for example. To make it, position a sphere so that it completely surrounds the key light.



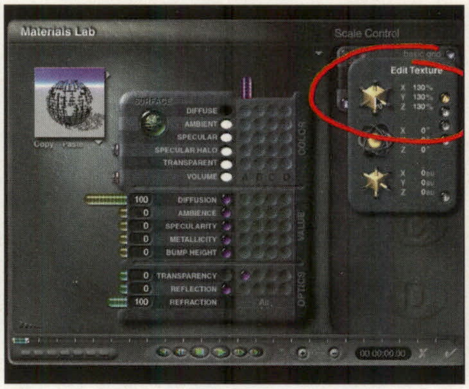
5 Activate the Texture Editor for the sphere and click in the 'A' column of the transparency row as shown in the image. We're only interested in the transparency setting on this texture.



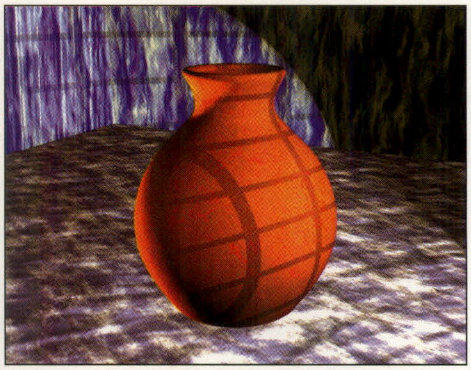
6 From the pull-down Texture Library menu, select the Basic Grid material, making sure the mapping type is 'spherical'. This makes a stencil that casts shadows – a bit like a window frame.



7 A test render shows how the effect works in the scene. The problem is, the grid is too large and so the result is not very interesting. The rim light could do with being a bit brighter too.



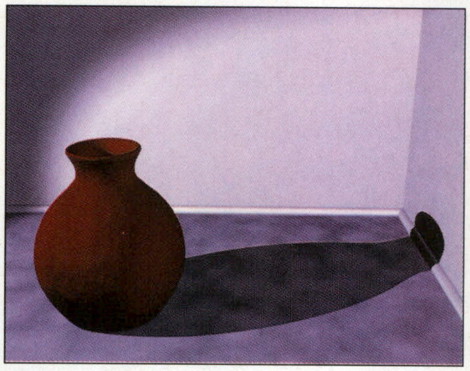
8 To fix the stencil, scale the texture on the sphere. Use the Transformation tools to scale it to about 300% – this is small enough to work. The rim light has been moved down and brightened up.



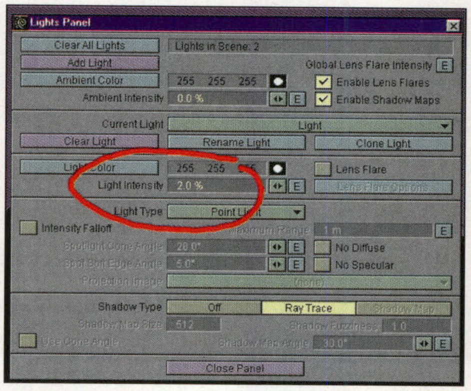
9 The final scene shows how much better the pot looks – it has a real feeling of solidity about it. The Shadow Intensity has been turned down in the Sky&Fog toolset. Try experimenting with different textures on the sphere.

Stage three: True soft shadows without radiosity

Lights have dimensions, and their shadows become more diffuse with distance – here's how to produce soft shadows that work in any software. We've used *LightWave 3D* – but most 3D packages will do...



1 First, here's what your average raytraced shadows look like (using *LightWave 3D* this time). As they originate from an infinitely small point, there's no 'spill' around the object. This produces a hard, unrealistic shadow.



Lights Panel

Lights in Scene: 2

Ambient Color 255 255 255

Ambient Intensity 0.0 %

☑ Enable Lens Flares

☑ Enable Shadow Maps

Current Light: Light

Light Color 255 255 255

Light Intensity 2.0 %

Light Type: Point Light

☐ Intensity Falloff

Maximum Range 1 m

Spotlight Cone Angle 20.0°

Spot Soft Edge Angle 5.0°

☐ No Diffuse

☐ No Specular

Projection Image (none)

Shadow Type: Ray Trace

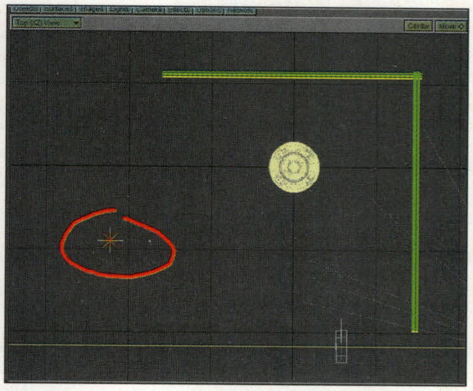
Shadow Map Size 512

Shadow Fuzziness 1.0

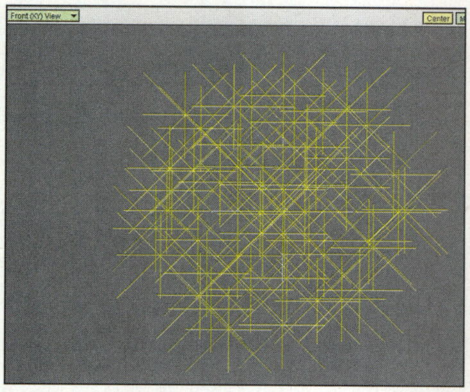
☐ Use Cone Angle

Shadow Map Angle 30.0°

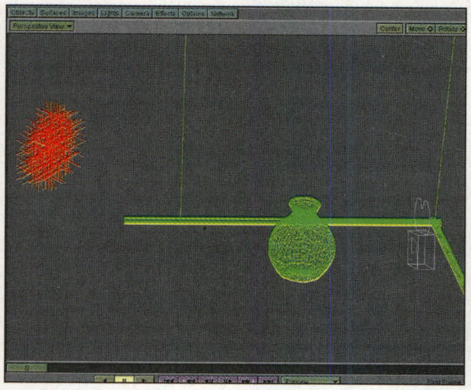
2 In order to build a light source with physical dimensions, we need to create a cluster of point lights. Each one must have a small intensity (2%) so they can be duplicated many times.



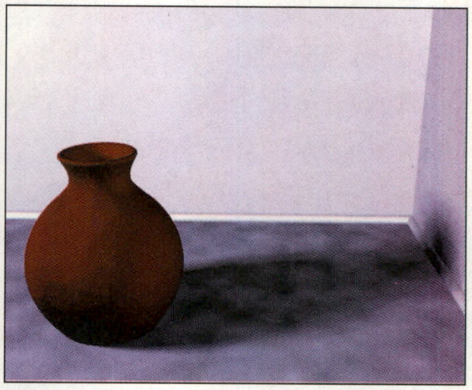
3 Before copying the light, it must be parented to a null object. This is so that the whole cluster can be manipulated as a unit. This may not be necessary in some packages.



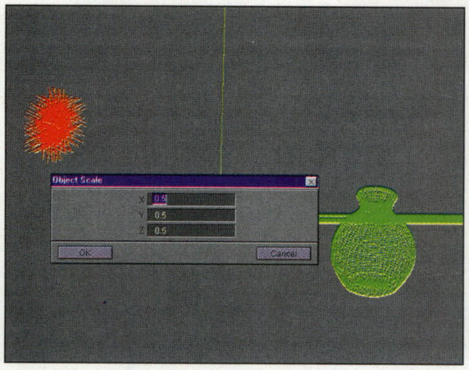
4 Go to the Front view and copy the point light 50 (yes, 50!) times. Now offset each light slightly to create a roughly circular 'disc'. The diameter of this disc is the size of the light source.



5 You should now be able to move the whole cluster around using the parent object. Try to position it square-on to the subject – this ensures an even distribution of the shadows.



6 This type of light source can take a very long time to render on slower systems. When doing tests, use a small window. As you can see, although better, the shadows are still a bit too fuzzy.



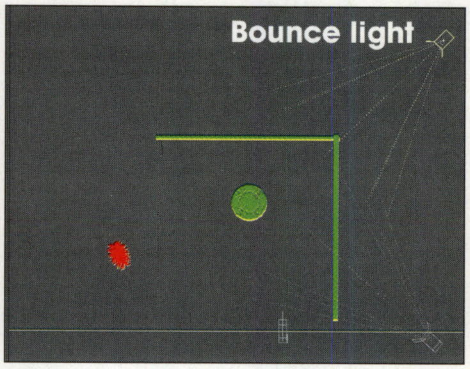
Object Scale

X 0.5

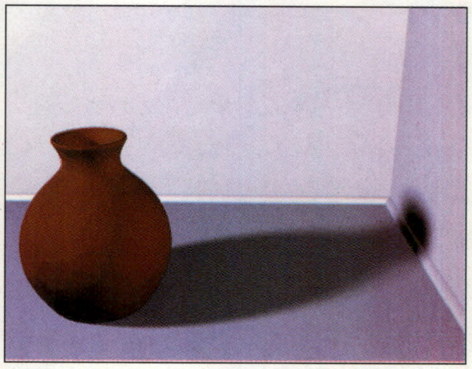
Y 0.5

Z 0.5

7 To tighten things up, use the parent object to scale the whole cluster down by about 50%. A smaller source means less light spill and so better shadows. Moving the source away from the subject would have a similar effect.



8 To further enhance the scene, the floor texture has been given a smaller, less intrusive bump size. An extra light has also been added to simulate the reflected light from the walls. It has a very low intensity of 10%.



9 The finished render has realistic shadows that behave in a natural way. Unlike mapped shadows, they diminish and spread with distance. More lights produce an even better effect. Try this in a complex scene to see how good it looks. ca>s

technique eight

Procedural

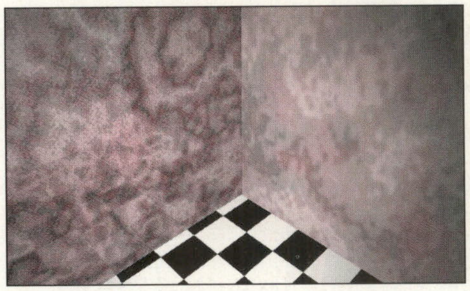
shaders

PART EIGHT OF OUR 3D TECHNIQUES TAKES YOU THROUGH THE BASICS OF PROCEDURAL SHADERS – USE THEM TO CREATE GREAT SURFACE EFFECTS. YOU CAN TRY THESE TIPS IN ANY 3D PACKAGE...

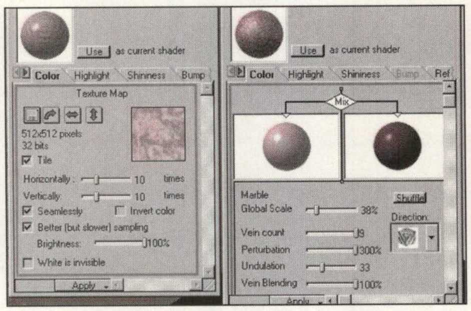
⇒

One: Shader mixing

The shader mixing in *Ray Dream Studio 5.0* is very powerful, but it can be tricky to get to grips with. Here, we see how it can be used to create custom surfaces. Check out the CD for a demo of *Ray Dream Studio 5*...



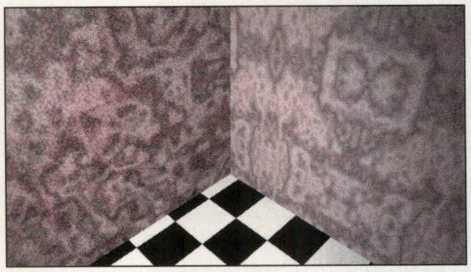
1 **We'll start by showing the fundamental difference between bitmap and procedural textures. The wall on the right has had a marble bitmap texture applied to it (in *Ray Dream Studio 5.0*), and the program has scaled the texture to fit the wall object, causing blurring. On the left, a marble procedural shader has been applied and the program has calculated the necessary coverage for the wall object – so no blurring (and more realistic reflections).**



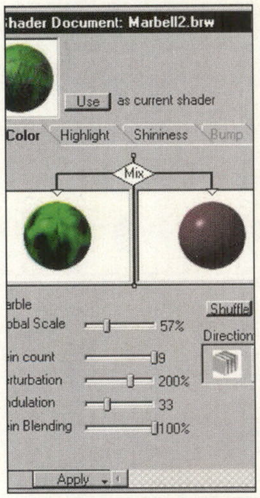
Texture Map
512x512 pixels
32 bits
☑ Tile
Horizontally: 10 times
Vertically: 10 times
☑ Seamlessly ☐ Invert color
☑ Better (but slower) sampling
Brightness: 100%
☐ White is invisible

Marble
Global Scale: 38%
Vein count: 9
Perturbation: 300%
Undulation: 33
Vein Blending: 100%

2 **If we look at the set-up for both textures, you can see the fundamental difference more clearly. On the left is the window for the bitmap texture, on the right that of the procedural shader (procedural textures are generally referred to as 'shaders'). You can see that on the left is a bitmap representing the marble texture. On the right, the marble is made by mixing two colours using a Marble function.**



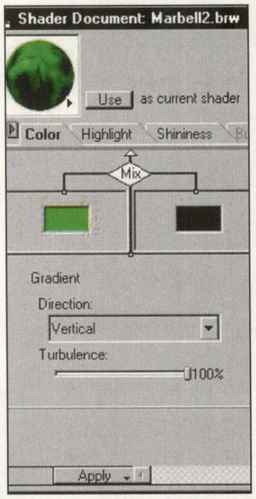
3 **If we want to increase the grain of the marble, we have no option but to tile the bitmap texture. This results in an artificial symmetrical pattern on the wall on the right (because we're using tileable textures – if we hadn't we'd have got ugly seams, which is worse). However, on the right we've got a more detailed marble texture which is completely seamless. This was achieved by upping the shader's sliders for Vein Count, Undulation and Perturbation. That's the basic essence of procedurals.**



Shader Document: Marbell2.brw

Marble
Global Scale: 57%
Vein count: 9
Perturbation: 200%
Undulation: 33
Vein Blending: 100%

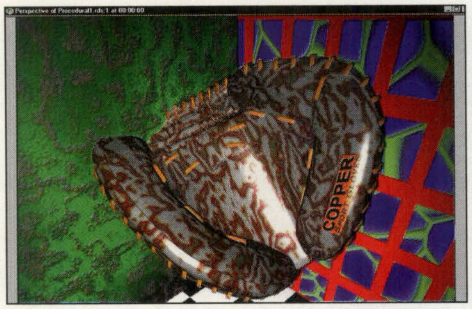
4 ***Ray Dream Studio 5.0* uses a very powerful concept when making shaders, known as a Shader Tree. This is a feature more usually found in high-end programs like *3D Studio MAX* and Alias *Maya*. Here, look in the Shader window for another marble texture. In the previous example, we mixed a flat pink and a flat brown with a Marble function to achieve the effect – but here we're mixing a Marble and a Granite shader to produce a third Marble shader. This is the top level of this shader's tree.**



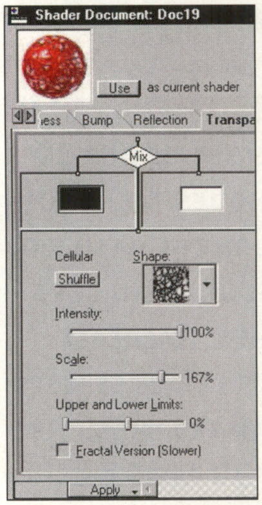
Shader Document: Marbell2.brw

Gradient
Direction: Vertical
Turbulence: 100%

5 **Clicking on the arrow on either shader's swatch takes you down one level in the shader's hierarchy. Here you can see the bottom level of the green/black shader – the two colours were mixed using a simple Turbulence function. There will be a complementary branch for the granite shader. Using this concept of branches and mixing functions enables you to build surfaces of arbitrary complexity.**



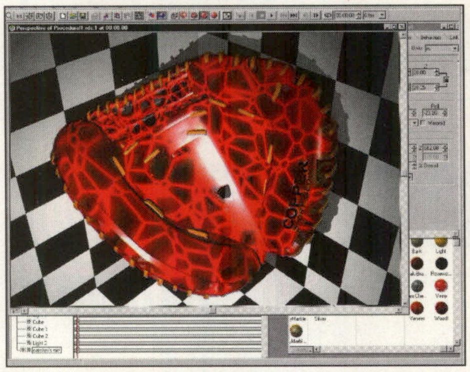
6 **In this image we've taken the stock baseball glove object from *RDS*'s Objects library and applied another marble shader to it. Note that there's no smearing or streaking, as the texture wraps around this fairly complex object (it also helps if you have the mapping type set to Parametric). On the right wall, you can see a texture made from a cellular mixer (the blue and green), which was in turn mixed with a red colour using *RDS*'s Wires function.**



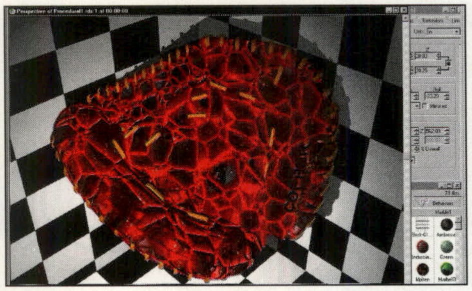
Shader Document: Doc19

Cellular
Intensity: 100%
Scale: 167%
Upper and Lower Limits: 0%
☐ Fractal Version (Slower)

7 **But why stop with just mixing colours? You'll know from technique six on Surface Texturing (p52) that renderers use greyscale images to control the transparency of a surface. So we've taken a shader and put a black and a white colour swatch into its Transparency channel. We then used the Cellular Mix function to blend the black and the white to produce a varying-transparency shader. The Cellular function contains eight mixing patterns, and it's worth your while experimenting.**



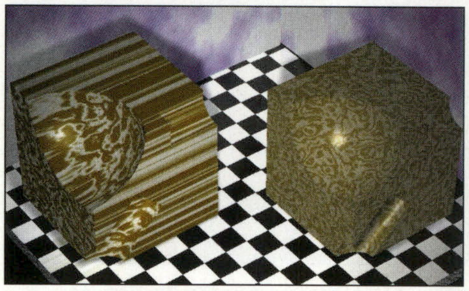
8 **Dragging the Shader swatch from the Shader window to the Browser palette saves it, and dragging the saved shader onto an object applies it. As you can see here, we've achieved a complex surface with varying transparency for very little effort. Note that the transparency doesn't show up in the shadows.**



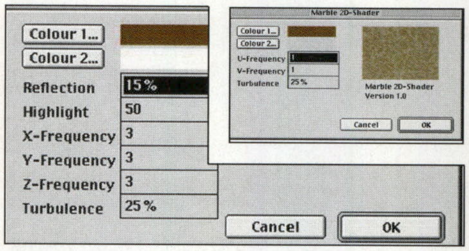
9 **Of course, we can extend this concept to any of the Property channels in a shader. Here, the same Cellular Mix was used to blend black and white in the Bump channel. Since the Cellular Mixer introduces greyscale information, we can use it to apply a bump to any surface. The important point here is that the mixing settings for Intensity, Scale and Upper and Lower Limits are identical in both the Bump and Transparency channels – so the effects overlay each other exactly, producing this alveolar surface.**

Two: Animated shaders

Many procedural shaders have built-in properties which enable them to be animated over time. *Cinema 4D XL* comes with a complete library of such shaders. You'll find the demo (and a 60-day trial version of *Cinema 4D GO*) on the CD...



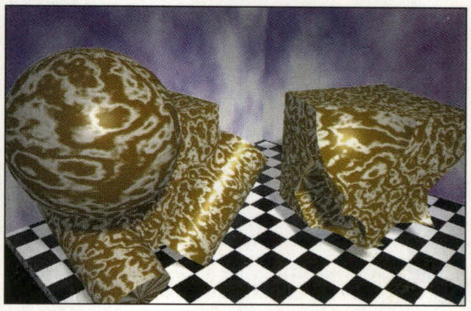
1 Another distinction between procedural shaders is the 2D and 3D varieties. *Cinema 4D XL* supports 3D shaders, and you can see the difference in this screenshot. We've taken a cube and Booleaned a few chunks out of it. Then we applied a 2D procedural marble shader to the cube on the left, and a 3D procedural marble texture to the cube on the right. The 2D shader texture only sits properly on the face perpendicular to the mapping plane.



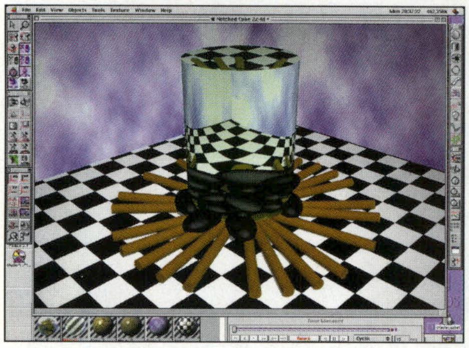
Colour 1...
Colour 2...
Reflection 15 %
Highlight 50
X-Frequency 3
Y-Frequency 3
Z-Frequency 3
Turbulence 25 %

Marble 2D-Shader
Colour 1...
Colour 2...
U-Frequency 1
V-Frequency 1
Turbulence 25 %
Marble 2D-Shader Version 1.0

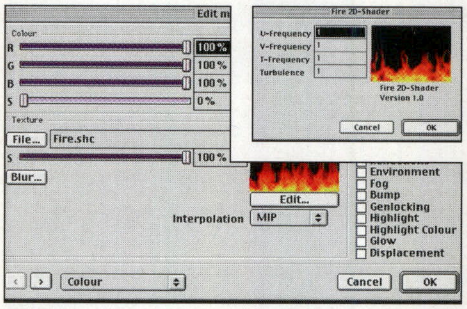
2 The difference can be seen by looking at the two shaders' set-up windows. The 3D Shader contains an extra term of the Z frequency of the pattern. In effect, the pattern goes 'straight through' the object, which is why the textures show up correctly when the object is cut or Booleaned. Note also that the 3D shader contains fields for reflection and highlight. This is because a 3D shader can't be used in the colour channel of a texture as 2D shaders can, so there's no opportunity in *Cinema 4D* for using bump, transparency and so on with them.



3 If your program doesn't support 3D shaders you can still fake the effect (almost). If you read the Booleans walkthrough, you'll remember that the objects that do the cutting leave their surfaces behind. So, if you apply the 2D shaders before you subtract the objects (left), you'll get an approximation of the 3D shader effect (right). Note, however, that you won't get the seamless quality at the vertices.



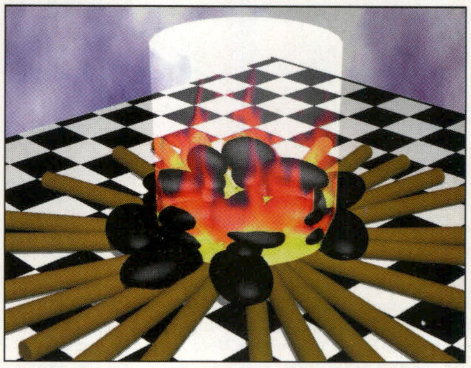
4 Since shaders are based on mathematical surface descriptions, many of them contain animatable properties. Here, we'll look at the Fire shader from *Cinema 4D*'s library. But first, we'll need a base model like this amazing, high-resolution camp fire model. The cylinder is the support for the Fire shader (it's refractive so it shows up in the screenshot).



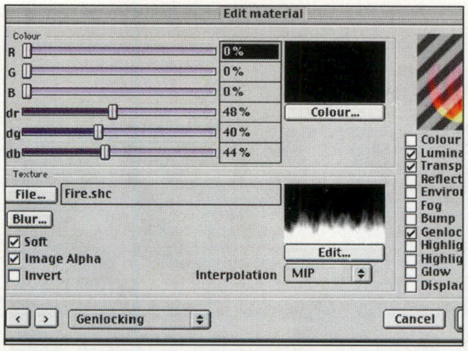
Edit m
Colour
R 100 %
G 100 %
B 100 %
S 0 %
Texture
File... Fire.shc
S 100 %
Interpolation MIP
☐ Environment
☐ Fog
☐ Bump
☐ Genlocking
☐ Highlight
☐ Highlight Colour
☐ Glow
☐ Displacement
Colour

Fire 2D-Shader
U-Frequency 1
V-Frequency 1
T-Frequency 1
Turbulence 1
Fire 2D-Shader Version 1.0

5 The first step is to create a new texture in the Materials Manager, then double-click it to bring up the Edit Material dialog. The Fire shader (Text>2D Shaders) is loaded into the colour channel of the material. Since the background is black, activating a Transparency channel should cut out the background. Clicking the Edit... button enables you to change the flames' parameters. The Preview here is animated so you can see what you're getting.

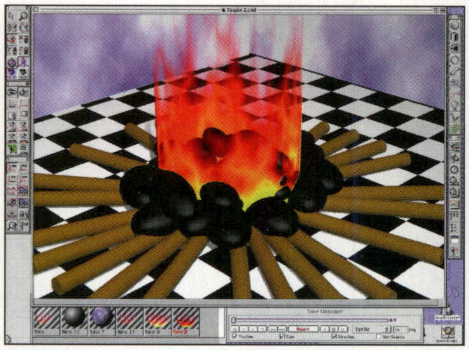


6 The Fire shader is applied to the cylinder (using cylindrical mapping, of course) – but doing a test render, we can see that something's not right. The transparency isn't what we'd expect, and is the outcome of the way that *C4D* handles transparency. The flames animate nicely at this stage, though.

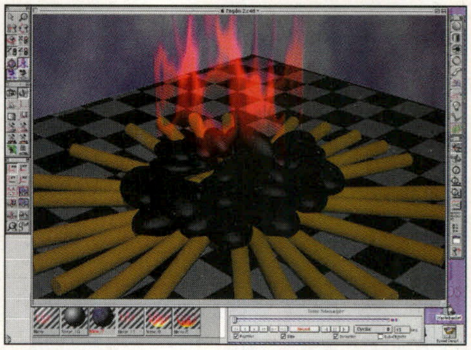


Edit material
Colour
R 0 %
G 0 %
B 0 %
dr 48 %
dg 40 %
db 44 %
Texture
File... Fire.shc
☑ Soft
☑ Image Alpha
☐ Invert
Interpolation MIP
☐ Colour
☑ Lumina
☑ Transp
☐ Reflect
☐ Enviro
☐ Fog
☐ Bump
☑ Genloc
☐ Highlig
☐ Highlig
☐ Glow
☐ Displac
Genlocking

7 We'll have to use the Genlocking channel to cut out the black background of the Fire shader. Luckily, version 5.2 of *C4D* contains a new feature called Image Alpha, which, when checked, supplies an alpha mask of the Fire shader. This animates along with the shader. Setting the dr, dg and db sliders, we can lock out the black background.



8 This new shader has a masked out a clear area thanks to the Genlocking effect. We also applied the Fire shader to the Luminosity channels to get more of a glow to the fire. Note also that there's no need to set keyframes to make the fire dance. The movement is defined within the shader itself – so all you need to do is set the frame count and off you go.

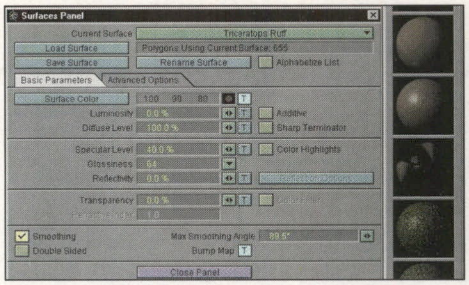


9 As a final touch, we turned off the Luminosity channel and turned the transparency channel back on, with the Genlocking channel still in place. This produces a more gas fire-like effect, and you have to keep the lights in the scene turned low to get the full effect. Stretching this texture linearly in its Y direction is a good way to get the afterburn flames of jet engines.

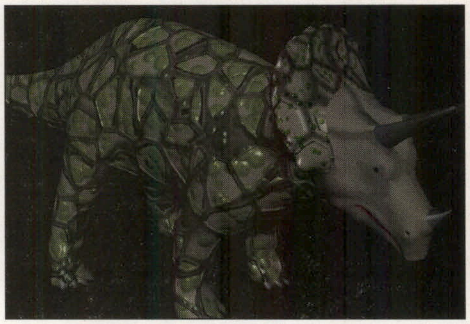
⇒

Three: Applying surfaces

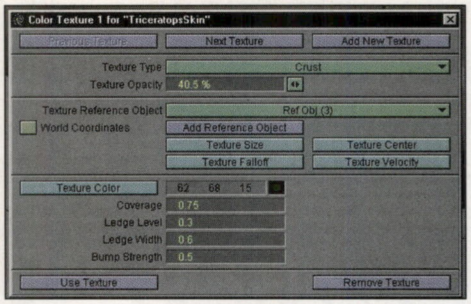
Next, we move on to *LightWave* and *Inspire 3D*, and call up the Surfaces requester…


Surfaces Panel
Current Surface: Triceratops Ruff
Polygons Using Current Surface: 655
☐ Alphabetize List
Basic Parameters
Surface Color: 100 90 80
Luminosity: 0.0 %
☐ Additive
Diffuse Level: 100.0 %
☐ Sharp Terminator
Specular Level: 40.0 %
☐ Color Highlights
Glossiness: 64
Reflectivity: 0.0 %
Transparency: 0.0 %
☑ Smoothing
Max Smoothing Angle: 89.5°
☐ Double Sided

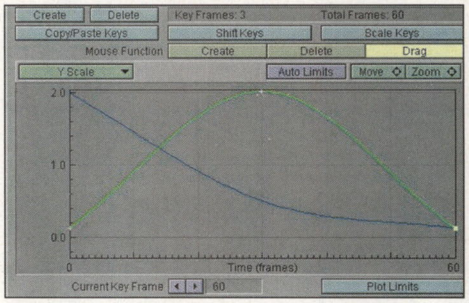
1 *LightWave 3D* also has a few procedural tricks up its sleeve (and all the techniques discussed here are applicable to *Inspire 3D* as well). This is the Surfaces requester where surfaces are designed: the thumbnails on the right show the current surface. Although the surface at the bottom of the Samples window (made from overlaying the Crust and Veins shaders) looks as if it will do us for dinosaur skin, if we apply it to the model…



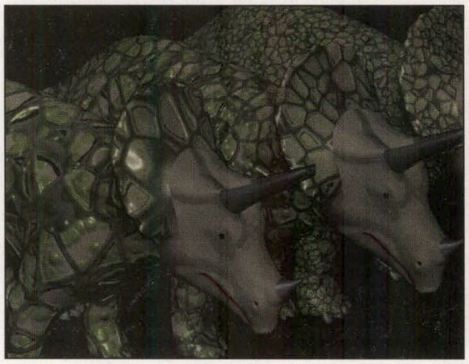
2 … it isn't exactly what we want at all. The sphere in the Samples window is one metre in diameter, and our Triceratops is, apparently, much smaller than that. There are two ways we can fix this: first, by setting the Texture Size fields in the Surface Colour requester – but entering the values again and again can be a chore.


Color Texture 1 for "TriceratopsSkin"
Texture Type: Crust
Texture Opacity: 40.5 %
Texture Reference Object: Ref Obj (3)
☐ World Coordinates
Texture Color: 62 68 15
Coverage: 0.75
Ledge Level: 0.3
Ledge Width: 0.6
Bump Strength: 0.5

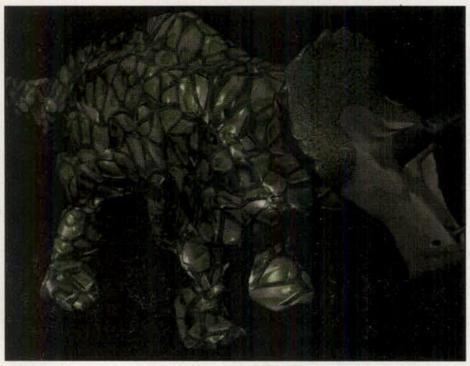
3 A far better (and more versatile) way is to associate a Texture Reference Object with the current surface. With the Skin surface selected, click on the T button next to 'Color Texture' in the Surfaces requester. This brings up a sub-dialog for the present shader, where you'll find an 'Add Reference Object' button. This places a null object in your scene, which is associated with the texture.


Key Frames: 3
Total Frames: 60
Mouse Function: Drag
Y Scale
Current Key Frame: 60

4 Scaling or rotating the reference object produces a corresponding scale or rotation in the texture. But since it's a *LightWave* object, we can also control it using an Envelope. Here's the Envelope for the Texture Reference Object's Y scale. You can see that we're changing it over the course of the animation (corresponding X and Z scales are also added to keep the whole thing smooth).



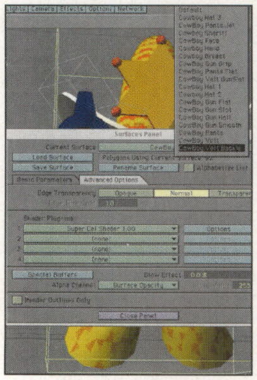
5 The result is that we have a surface which is animated over time. The effect that we've achieved here is a pulsing effect of the dinosaur's skin, by increasing then decreasing the texture scaling without having to manually resize any texture maps.



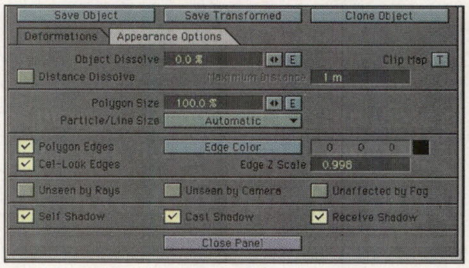
6 Of course, it's not only colour and bump which can be applied procedurally. Here, we've stuck a procedural ripple into the Displacement map channel of the Triceratops, which has actually distorted the mesh of the model.

Four Cel shader

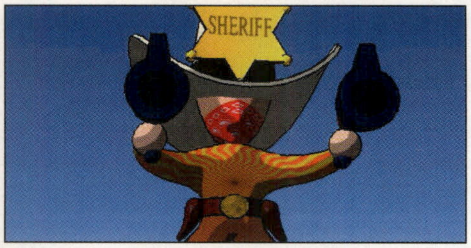
Finally, we'll try our hand at mimicking hand-drawn cartoon style with *LightWave* and *Inspire* again…



1 Now we'll look at *LightWave* and *Inspire*'s Cel Shader – a procedural shader that mimics the look of hand-drawn cartoons. Assign the Cel Shader plug-in (either IN_CelShader under *Inspire* or LW_SuperCelShader). This is done from the Advanced Options tab of the Surfaces panel. The drawback is that you have to select each surface in your scene individually, and assign the shader to it.


Appearance Options
Object Dissolve: 0.0 %
☐ Distance Dissolve
Maximum Distance: 1 m
Polygon Size: 100.0 %
Particle/Line Size: Automatic
☑ Polygon Edges
Edge Color: 0 0 0
☑ Cel-Look Edges
Edge Z Scale: 0.998
☐ Unseen by Rays
☐ Unseen by Camera
☐ Unaffected by Fog
☑ Self Shadow
☑ Cast Shadow
☑ Receive Shadow

2 Next, you have to go to the Objects panel and turn on the two options for Polygon Edges and Cel-look edges under the Appearance Options tab. Quite why these aren't included in the actual Cel Shader Options panel is a bit of a mystery to us…



3 Hit F9 for a render and hey presto! You have one genuine cartoon character, without one drop of ink spilt or one packet of acetate opened. The beauty of this approach is that you can combine advanced motion control and shadow casting with the feel of old-style cartoon animation. ca>s

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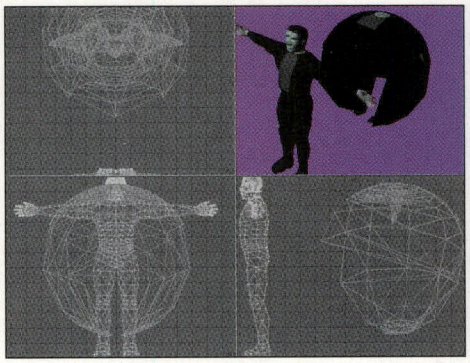
technique nine

Morphing

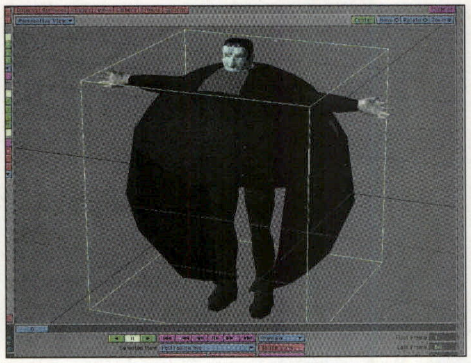
Technique number nine highlights morphing: how to seamlessly transform from one object to another. Try these in any 3D package – we used *Inspire 3D* & *Infini-D 4.5*...

One: Simple morphing

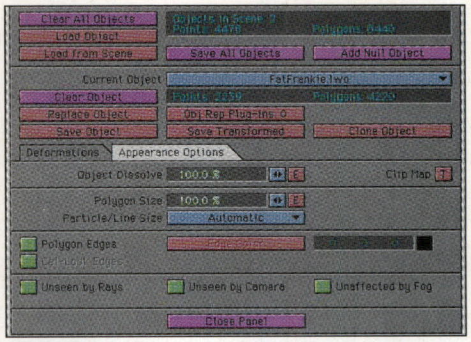
First, we'll be looking at a simple example of shape morphing using NewTek's *Inspire 3D*. This program has some of the most robust morphing controls around. However, you can try these tips in any 3D package...



1 We'll use the Frankenstein.lwo model which comes with *Inspire* to demonstrate the morph (but you can use any other you have). Here, you can see two frankies, each on a different layer. The second monster has had the IN_Spherize plug-in applied, which wraps the model around a sphere's surface.

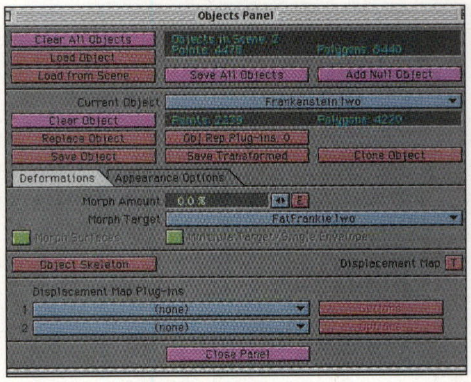


2 Each frankie is frozen (Tools tab) and imported into Layout. Note that they're occupying the same position – this is important. We separated them in picture 1 for illustration purposes only. If they didn't occupy the same position, you'd be morphing their position as well as shape.



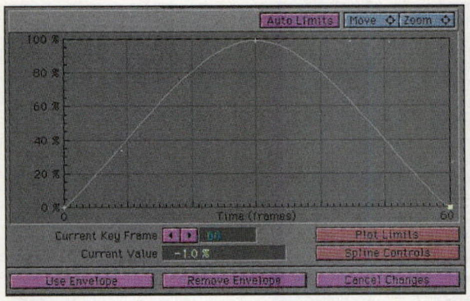
Objects in Scene: 2
Points: 4478
Polygons: 6440
Current Object: FatFrankie.lwo
Points: 2239
Polygons: 4220
Obj Rep Plug-ins: 0
Object Dissolve: 100.0 %
Polygon Size: 100.0 %
Particle/Line Size: Automatic

3 The spherized Frankie is going to provide morph target information for the other. As such, we don't need to see it. To make it invisible, open the Objects panel and click on the Appearance Options tab. Set Object Dissolve to 100%, which makes the spherized Frankie invisible. Make sure the frame count slider is at zero when you do this.



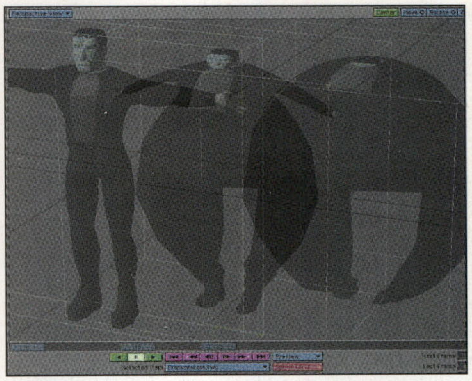
Objects Panel
Objects in Scene: 2
Points: 4478
Polygons: 6440
Current Object: Frankenstein.lwo
Points: 2239
Polygons: 4220
Obj Rep Plug-ins: 0
Morph Amount: 0.0 %
Morph Target: FatFrankie.lwo
Displacement Map Plug-ins
1 (none)
2 (none)

4 The next thing to do is set the spherized version to be the target for the regular version. From the Deformations tab of the Objects panel, choose the Fat version from the Morph Target drop-down menu. The Morph Amount is initially set to zero.

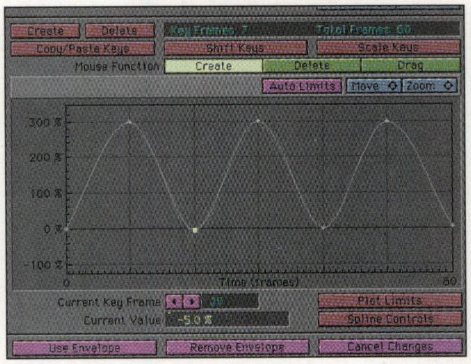


Current Key Frame: 60
Current Value: -1.0 %

5 To control the morph, we need to set an envelope (a curve which controls how something changes over time). Click on the 'E' next to the Morph Amount field to bring up the Envelope window. It's now just a simple matter to click and drag to set keyframes. With the Create button depressed, click at 100% at 30 seconds – this will be the full extent of the morph. Then click on 0% at 60 seconds, and this returns the morph back to its original state.

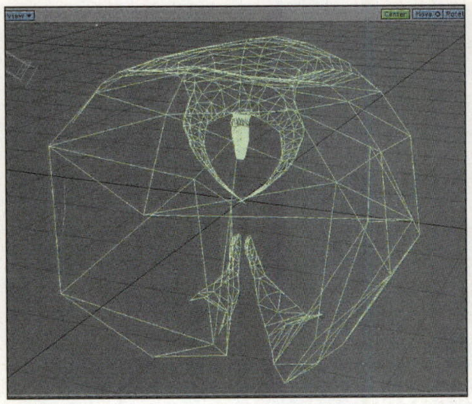


6 If you scrub the frame counter (drag it back and forth), you'll see the model gradually spherize, then return to normal. For the best results, make sure that the OpenGL or QuickDraw 3D preview is on (Options panel>Layout View tab). That's morphing.

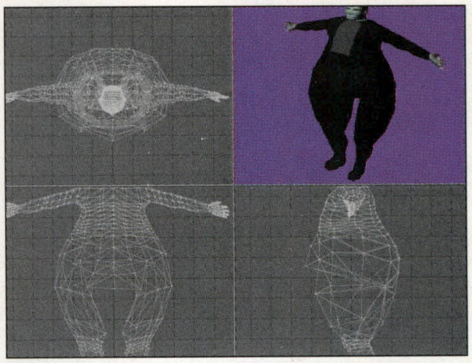


Key Frames: 7
Total Frames: 60
Mouse Function: Create
Current Key Frame: 20
Current Value: -5.0 %

7 Of course, the real secret is in the enveloping. You can play around with the Tension, Continuity and Bias settings for the envelope to see what happens, or try setting additional keyframes with different values. Here, we've assigned an envelope that makes our monster pulsate.



8 Interestingly, you can go higher than 100% with a morph – although results aren't always predictable. Here, we've set the morph to 300%. As you can see, our Frankie has started to turn in on himself.

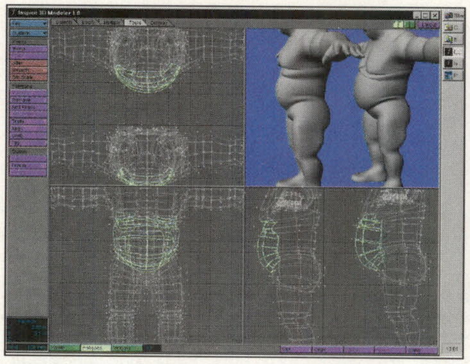


9 Morphing can also be used as a modelling tool, at a push. The Spherize plug-in is an all-or-nothing effect, but you can use the intermediate morphs to control it. If you select Save Transformed from the Objects panel, you can 'capture' an intermediate stage of the morph as a polygonal model.

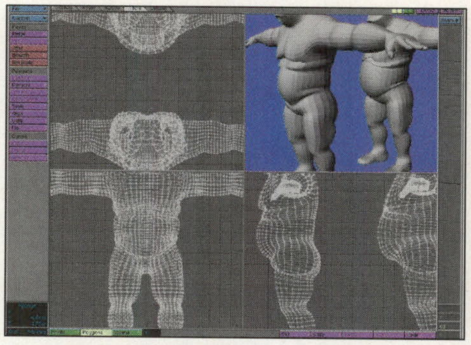
⇨

Two: Breathing morphs

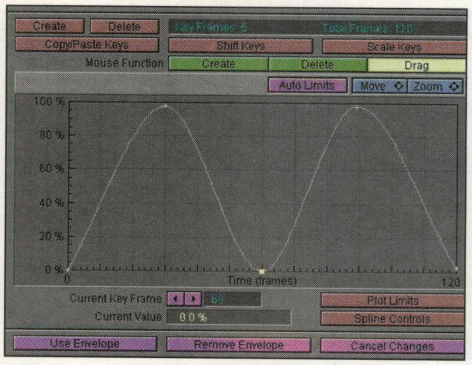
Next, we'll look at a real-world example of using morphing to make a character 'breathe'. Also, we'll look at using the envelope to control the animation, and at simple multi-target morphing...



1 First, we've taken the Fatpire.lwo object that comes with *Inspire 3D*. This is a MetaNURBS object, which is ideal for our purposes. To make the breathing motion, we selected the polygons of the belly and lower chest area, and applied a Smooth Scale to them (Tools tab), with a value of 400mm.

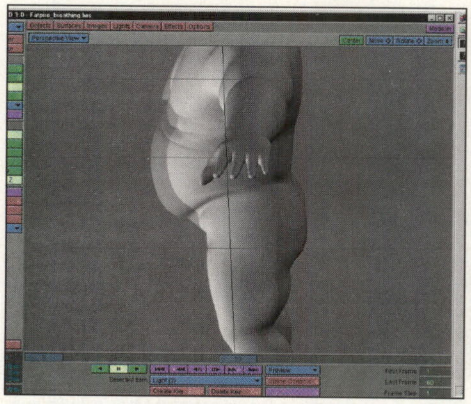


2 Next, we have to Freeze (Tools tab) the MetaNURBS model before we can import it into the Layout application. Here you can see that it's been converted into polygons. Note again, that both objects should occupy the same position on their respective layers. We've separated them here to illustrate what's going on more clearly.

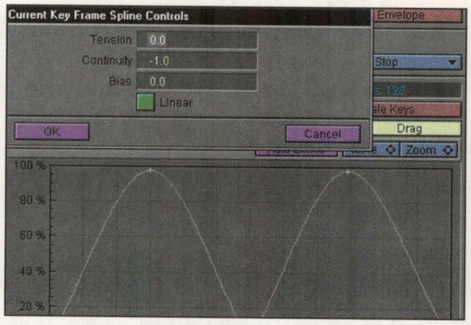


Current Key Frame
Current Value 0.0 %

3 As before, we set up the morph target and assign an envelope to control the morph. Since breathing is cyclical, we assign a simple cyclical sequence to the envelope across 120 frames. Simply use the Create Key button and click at the appropriate percentage values to set keyframes.



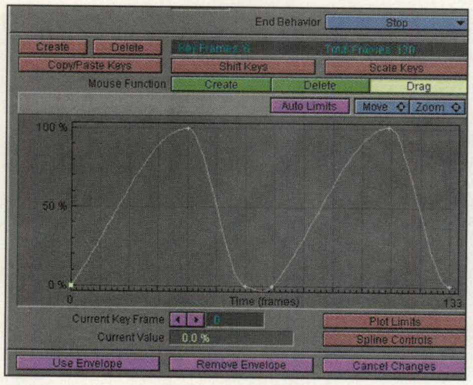
4 Now, if we scrub the frame slider the belly moves in and out rhythmically. But the movement isn't quite right – it's too piston-like. We'll have to edit the envelope to get things looking right.



Current Key Frame Spline Controls

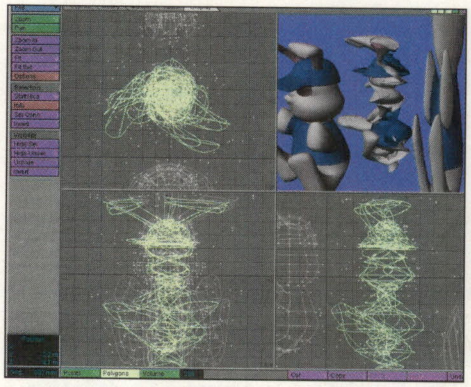
Tension 0.0
Continuity -1.0
Bias 0.0
☐ Linear

5 The first thing to do is to put in a natural stop at the end of each breath cycle. We can do this by accessing the Spline Controls panel from the Envelope window. If we select the keyframe at 60 frames then hit the Spline Controls button, we can use the panel to alter the Continuity at that point. A value of -1.0 means no continuity – a natural break. Alternatively, you can hold down 'C' and drag.

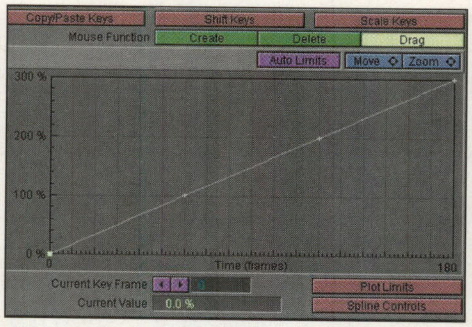


Current Key Frame 0
Current Value 0.0 %

6 You'll probably find that the movement is a little better, but not perfect. We finally settled on the graph shape in this window. It gives a slow inspiration, rapid exhalation and a slight pause between breaths.

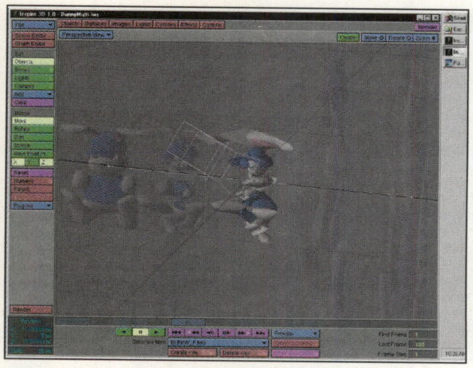


7 Next, we'll look at how to morph between multiple targets. Here you can see three bunny models, two of which have had Vortex and Stretch (Modify tab) applied to them. We'll morph between the three of them.



Current Key Frame
Current Value 0.0 %

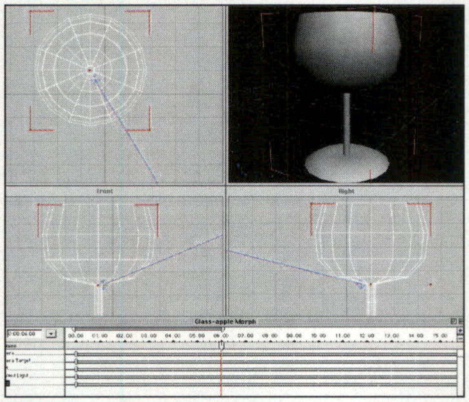
8 *Inspire* has a trick to make multi-target chains easy to set up. First, the objects are imported into Layout as usual. Then object two is set to be object one's target, object three is object two's target, and so on along the chain. All objects except the first are set to 100% dissolve. The envelope for object one is then set with keyframes from 0-100%, 100-200%, 200-300% and so on.



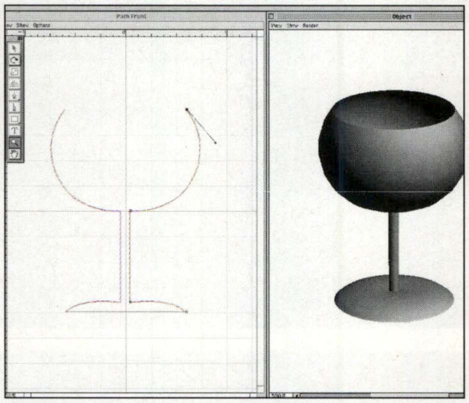
9 On closing the Envelope window, click in the checkbox that says Multiple Target/Single Envelope – this is used to control the morph across all targets. 0-100% controls object one morphing to object two, 100-200% controls object two morphing to object three, and so on.

Three: Transforming morphs

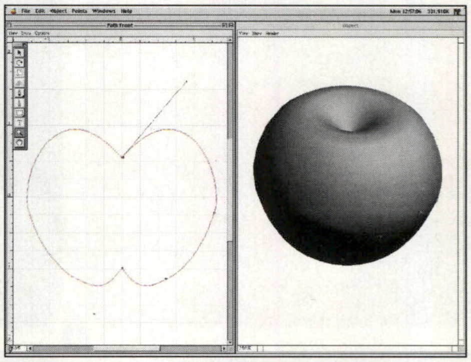
Now we'll look at how to transform things completely via morphing. Previously, we were largely acting on the same objects – now we'll be turning one object into another. We used *Infini-D 4.5* for this – the demo of v4 is on the CD...



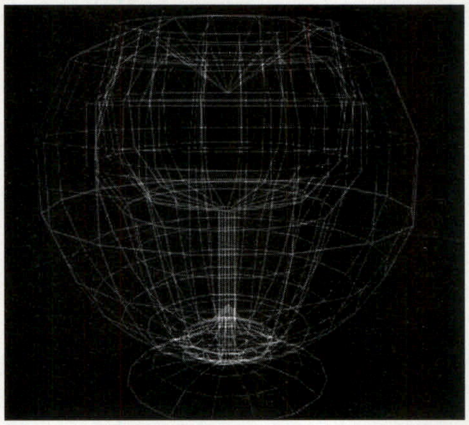
1 We'll start in *Infini-D*'s set-up environment. Here, we've chosen the standard wine glass primitive from the drop-down menu and placed it in our scene. This is the start point for our morph.



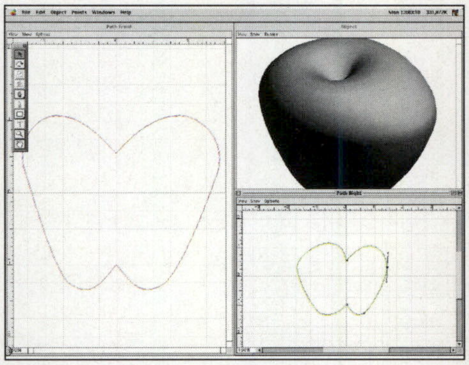
2 Double-clicking on the glass with the Cross-arrow tool takes you into the SplineForm Workshop, where you can see the constituent splines that make up the wine glass primitive.



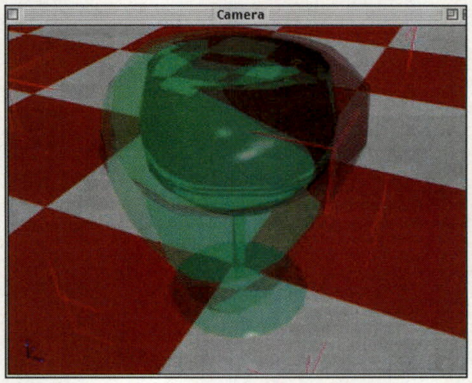
3 Next, we move the time slider in the Sequencer window to a number of seconds. By using the Arrow tool and click-dragging on individual points, we can mould our wine glass into a basic apple shape. Note that by default, four-way symmetry is chosen from the Points menu, so the apple is symmetrical.



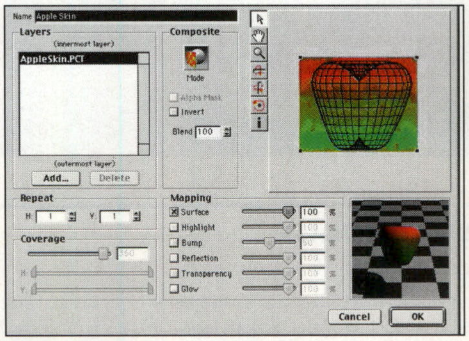
4 By scrubbing the time slider (with Preview set to Wireframe), we can see the glass morph into the apple shape. So far, so good: now for more realism.



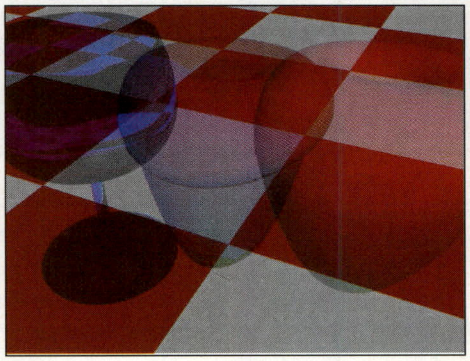
5 If we deselect four-way symmetry in the Points menu and bring up the Path Right window (Windows menu), we can individually edit the four splines to get a more realistic apple shape. Remember, though, that you must never add or remove points when editing like this, or the morph won't work.



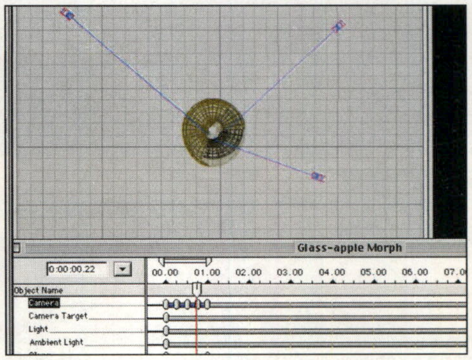
6 Now the effect is more pleasing, because the symmetrical glass morphs into the asymmetrical apple. Here, we've assigned a glass surface to the glass and rendered it using the Preview Phong renderer. Trouble is, apples aren't made of glass...



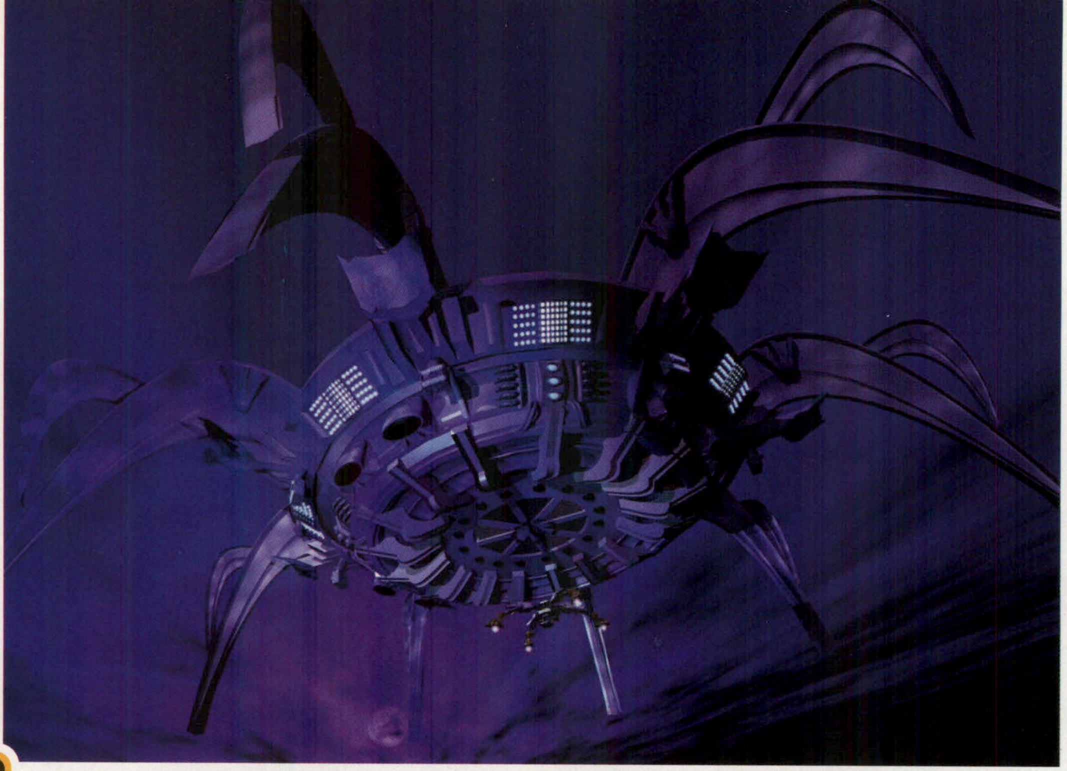
7 Luckily, surfaces can be morphed as well as shapes, so all we need to do is paint a bitmap to represent an apple skin, and import it into a new shader – using the Composite Surfaces tab on *Infini-D*'s Surfaces palette. When the shader's done, simply drag it from the Surfaces palette onto the apple, with the time slider set to the end of your sequence.

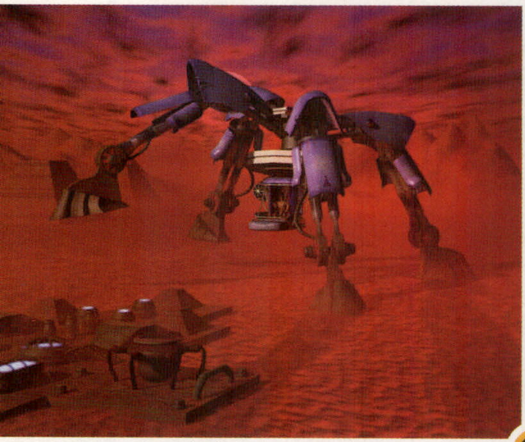


8 When everything is finally in place, you can do a final raytraced render (Render... from File menu), with everything turned on to high quality. This composite shows the beginning, middle and end stages of the render. This may take a while using *Infini-D*'s renderer, though.



9 If you're feeling particularly adventurous, you can animate the camera's position too, so everyone can see the work you've put in to modelling your apple. One final thing that needs mentioning – you can't morph a camera into a light or a spotlight into a parallel light, so don't even try! ca•s





1

computer arts special
The definitive guide to mastering 3D • Mac & PC
ca s02

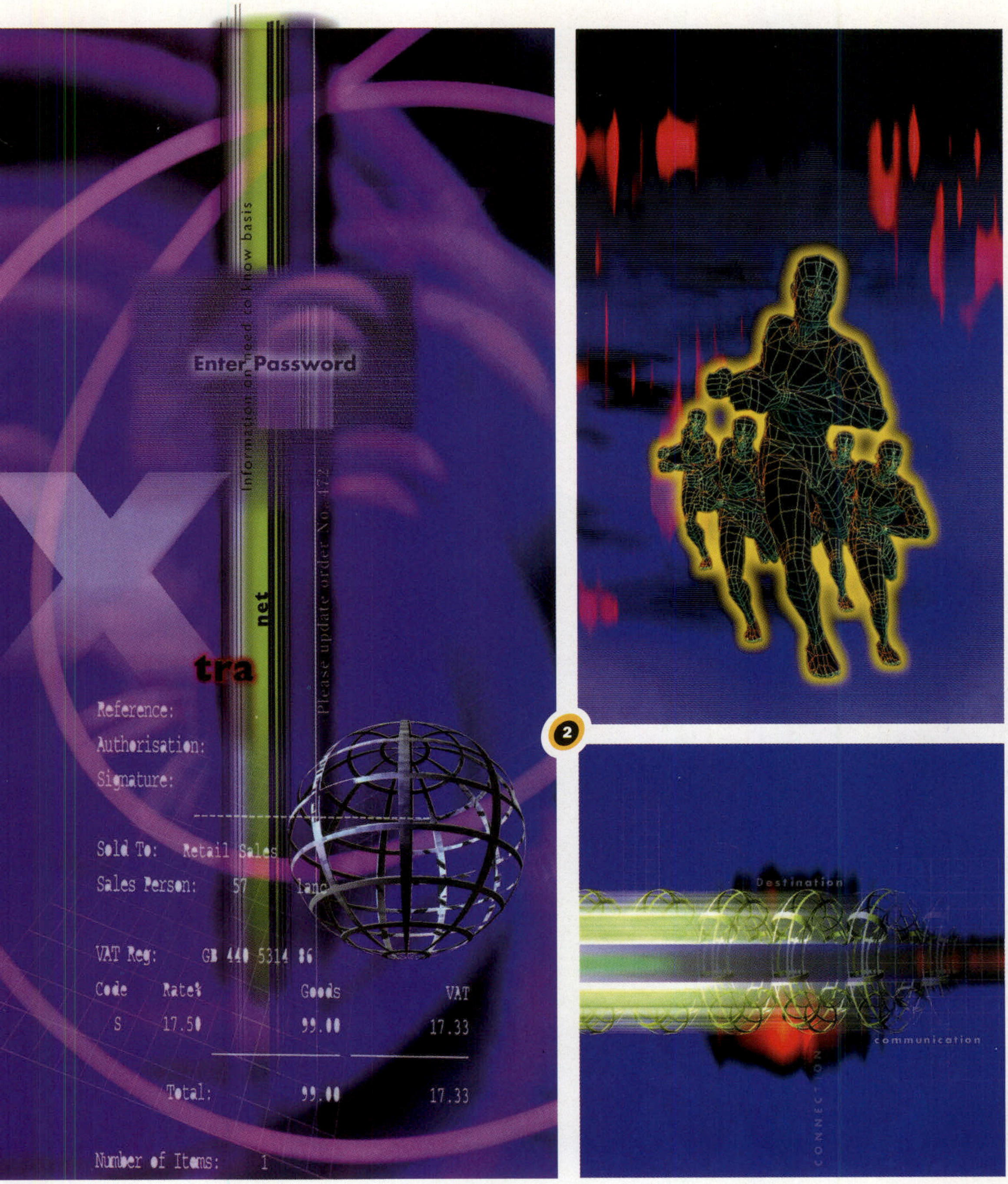
exposure

Feast on a showcase of 3D art from *Computer Arts* readers

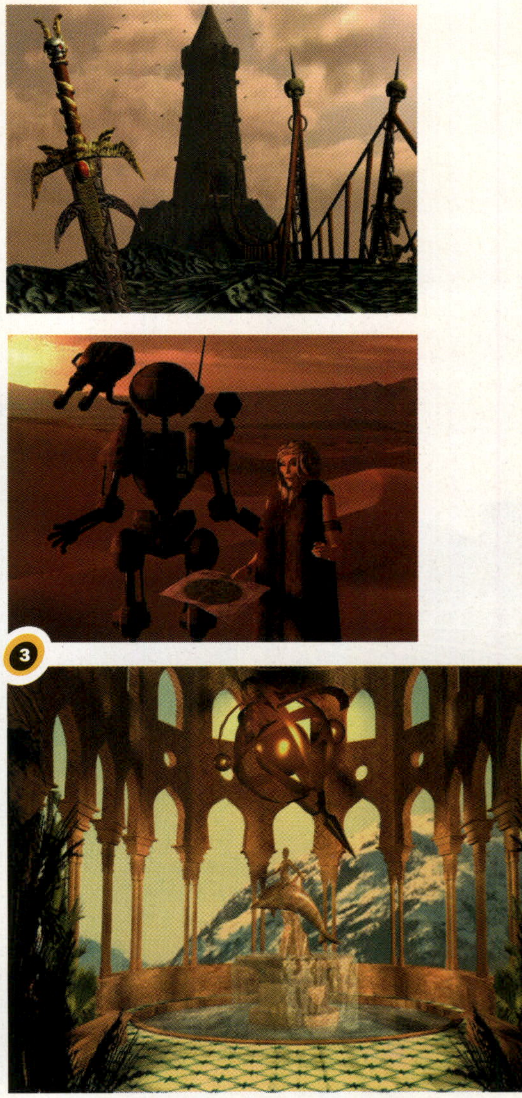
1 Terrain of the Winged Alien (all)

Harvey Mann e hmann@nlc.net.au

These images are stills from an animation that Harvey created in order to improve his character animation skills. While it was still in production, MetaCreations used it in last year's Siggraph show. A year later, having spent most of his spare time on the project, it is finally complete. Harvey mainly uses *RayDream Studio 5* and for the 'Wingman' animation he animated a *Poser* figure in *Ray Dream*, and created a world using *Four Elements* plug-in by RayFlect. He then used *Bonebender* for animating the figure within that world. He also created some large texture maps (with more than 1000 pixels) for the figure's face and body, and painted them by hand in *Detailer* using the Airbrush. Harvey also remodelled the *Poser* face to create an individual look using a mesh modeller; he built new eyes, teeth and a tongue. A year starts to sound surprisingly short, doesn't it?



2



3

2 On the Way, No Way in and Clone Racing (clockwise from top left)

Terry Hedges t 01634 230 593

For 'On the Way', Terry chose a texture in *KPT* Texture Explorer and played with hue and saturation, levels and curves. Then he saved a section of the background as another layer, applied Retroscan to it, and used *Bryce* to create the circles. He then opened these in *Photoshop*, and applied severe Motion Blur to them to get the right effect.

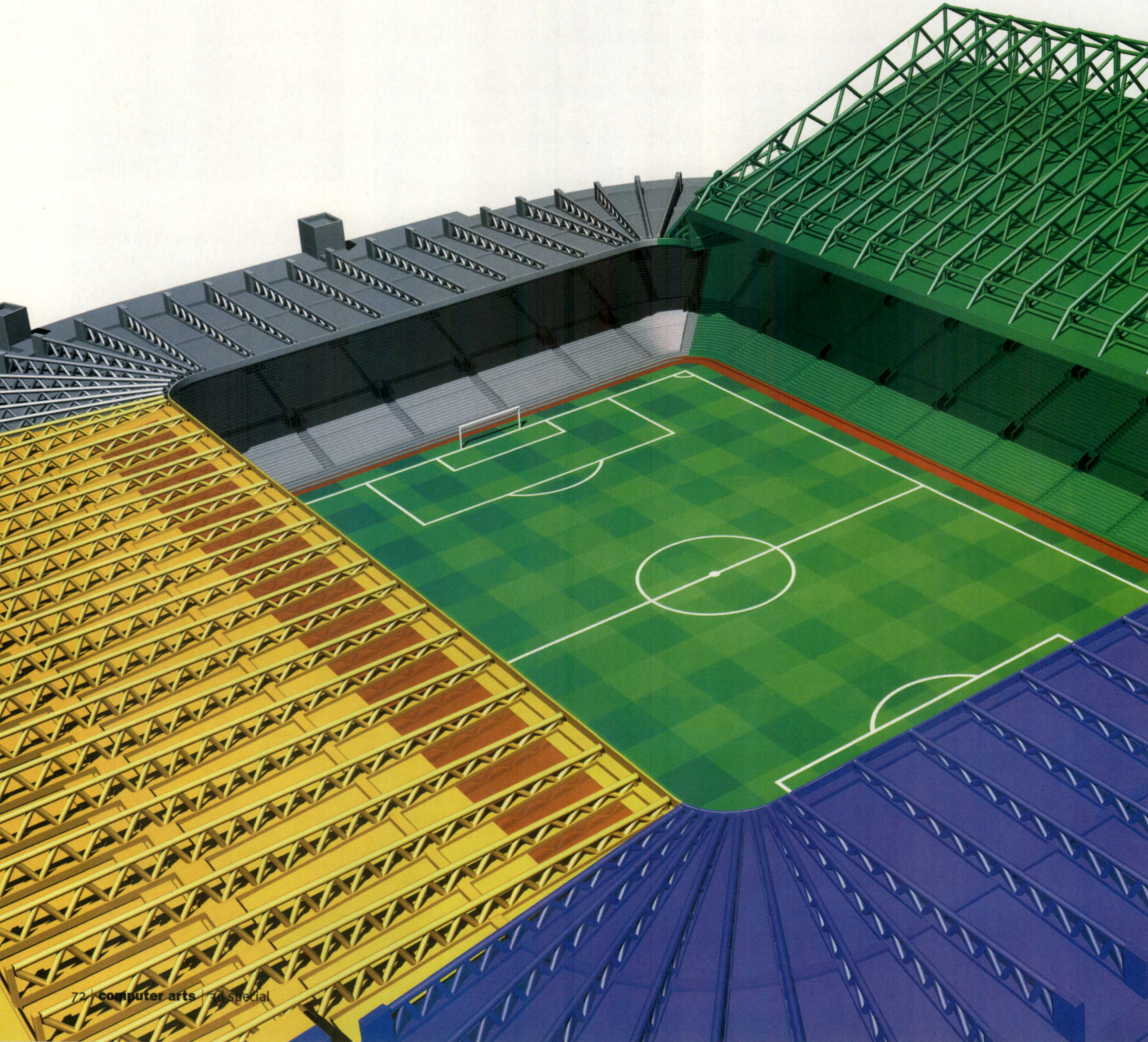
'No Way In' was made to create the feeling of a mechanical watchdog. It was created in much the same way as 'On the Way'. Terry drew light magenta lines in *Illustrator* using the Brush tool. He then opened it in *Photoshop*, coloured it up and faded it with a layer mask. 'Clone Racing' was created in *Poser* in Wireframe mode. Charlie grabbed and dropped them onto a background as several different layers, and then adjusted them for colour and glow.

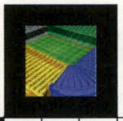
3 Untitled (above)

John Falgate t 01603 631 197

John created these images in his spare time on a Pentium 150MHz PC with 24Mb of RAM. Most of the models were created with the Windows version of *Imagine*, converted to DXF format and rendered in *Visual Reality*. He then used a combination of Corel *Photo Paint*, *Picture Publisher* and *Photoshop* to smooth out any rough edges and add extra lights. The female model started life many years ago on an Amiga 1200, and has slowly progressed along with John's computer upgrades.

John gets some of his inspiration from fantasy art books by Frazetta, Boris, Jim Burns and Les Edwards – and also from *Computer Arts*. He works at an art centre in Norwich which holds exhibitions and various musical events, and his work includes designing both posters and leaflets. John recently added *Poser 2* to his armoury, and *Bryce* is on his wish-list. ca•s

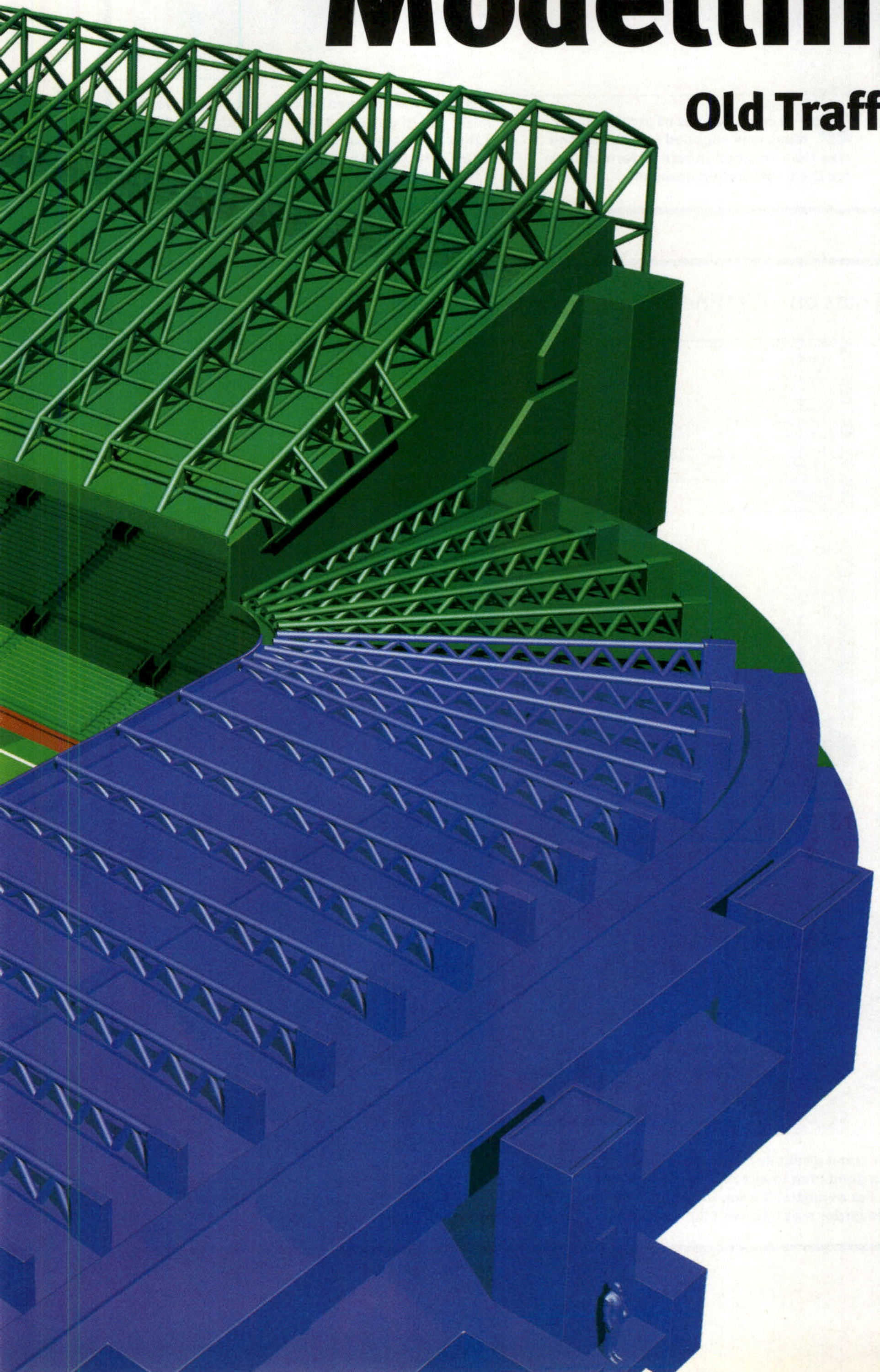




showcase: technique ten

Modelling

Old Trafford



MANCHESTER-BASED DESIGN FIRM STUDIO LIDDELL UNDERTOOK THIS IMPRESSIVE PROJECT – AND HERE THE 3D ARTISTS SPILL THE BEANS ON THE PROCESS, STEP-BY-STEP...

About Studio Liddell

Studio Liddell Illustration was formed some four-and-a-half years ago. Originally traditional airbrush illustrators, the partners realised their future lay with digital artwork. Investment of money and plenty of time has proved worthwhile, enabling the partnership to flourish with a wide spectrum of styles along with an ever-increasing client list. The Studio has never been busier attracting key projects from top agencies, and as a natural progression is moving into 3D animation.

The Old Trafford brief

Studio Liddell was asked to produce a 3D model of Old Trafford, for use on external signage around the ground.

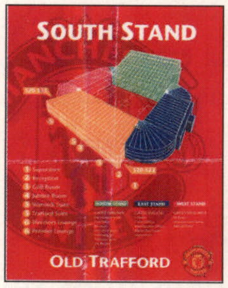
Eight different viewpoints were required, along with colour coding of each stand: it needed to be representative of the ground but not 100% accurate. Reproduction was to be at various sizes (to a maximum of two metres), so different resolution renderings were required too.

The company decided to use *form•Z* because it needed a program that was extremely precise in its modelling qualities, with the ability to import accurate *Illustrator* paths and transform them individually or together into 3D objects.

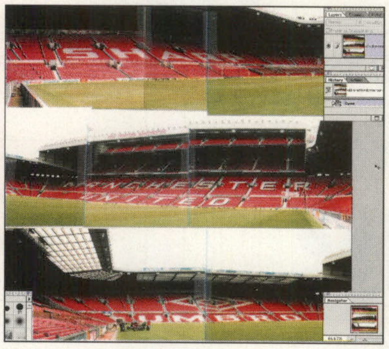
"*form•Z* was an immediate choice." says Studio Liddell's Andrew Jones. "Its Boolean Operator is excellent for editing the 3D objects, plus the extensive 'tool kit' enabled us to have the freedom of modelling in different ways, with unlimited undos. The luxury of being able to render in a precise and realistic manner – and all in one package – proved that this was the best program to use by far."

⇨

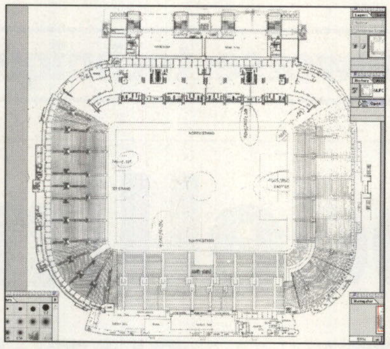
One: Reference material Every project starts somewhere – here's the think-tank stage...



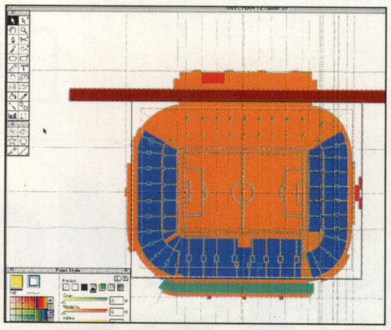
1 Springetts advertising agency provided a clear visual for what was required, the viewpoint and Pantone-referenced colours being very specific.



2 Various photographic reference material was supplied, and Studio Liddell was also given access to the ground to collate its own photographic reference.

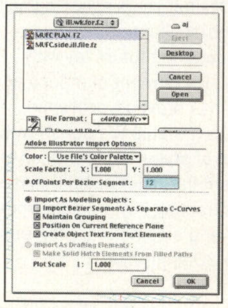


3 A complete set of architectural plans was supplied – and each one was then scanned in turn to form a basis for the construction process.



4 The scanned architectural plans were used as placed EPSs in *Illustrator*, and then accurate line work was created. Each element that had to be a solid object in *form•Z* was then drawn as a closed path.

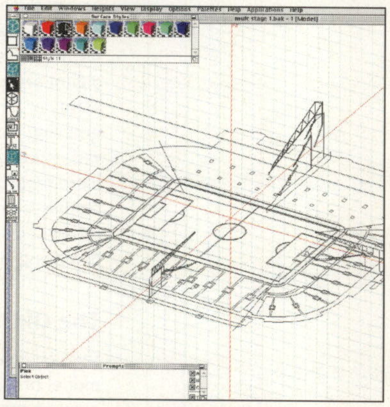
Two: Modelling the exterior Hard hats on – it's time to get to grips with some girders...



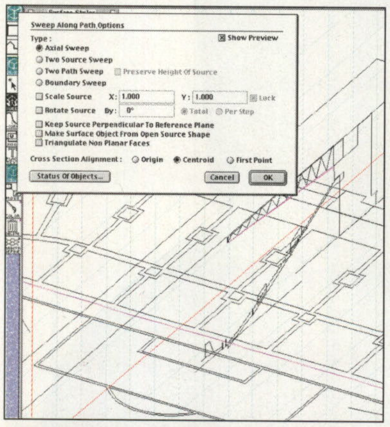
MUFC PLAN FZ
MUFC.side.ill.file.fz
File Format : <Automatic>

Adobe Illustrator Import Options
Color : Use File's Color Palette
Scale Factor : X: 1.000 Y: 1.000
Of Points Per Bezier Segment : 12
● Import As Modeling Objects :
☐ Import Bezier Segments As Separate C-Curves
☒ Maintain Grouping
☒ Position On Current Reference Plane
☒ Create Object Text From Text Elements
○ Import As Drafting Elements :
☒ Make Solid Hatch Elements From Filled Paths
Plot Scale 1: 1.000

1 The completed *Illustrator* artwork was then imported into *form•Z*. At this stage it's important to consider how smooth you want curved surfaces to appear. You can alter this in the Points Per Bézier dialog box.

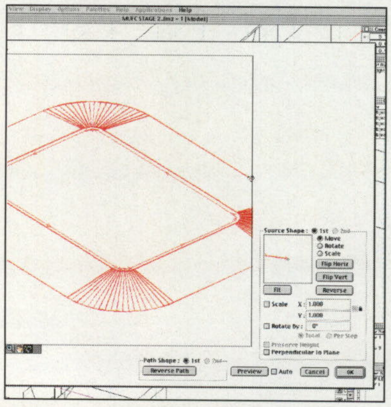


2 Once each *Illustrator* document has been imported, the next stage is to position each one on the appropriate reference plane.

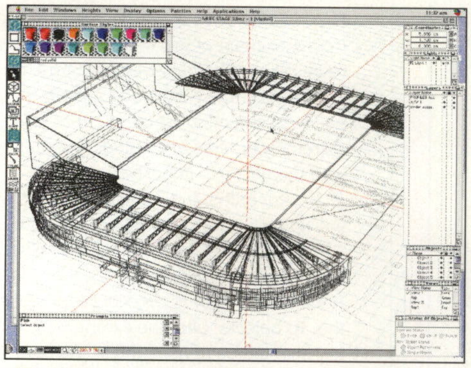


Sweep Along Path Options
Type :
● Axial Sweep
○ Two Source Sweep
○ Two Path Sweep ☐ Preserve Height Of Source
○ Boundary Sweep
☒ Show Preview
☐ Scale Source X: 1.000 Y: 1.000 ☒ Lock
☐ Rotate Source By: 0° ● Total ○ Per Step
☐ Keep Source Perpendicular To Reference Plane
☐ Make Surface Object From Open Source Shape
☐ Triangulate Non Planar Faces
Cross Section Alignment : ○ Origin ● Centroid ○ First Point

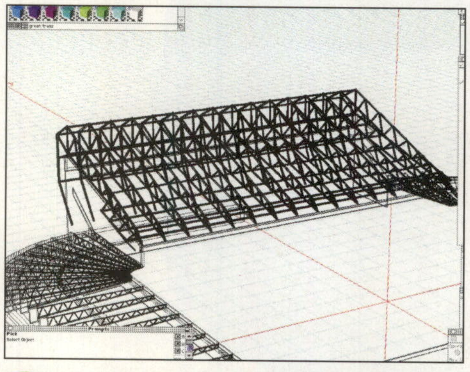
3 The roof sections seemed a good place to start. This was accomplished using the Sweep tool set to Axial Sweep.



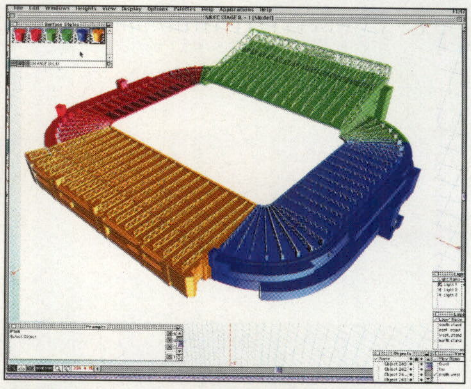
4 Once the Object and Sweep Outline have been selected, the Sweep Preview window appears. Here, you can position your object in relation to the Sweep Path.



5 The east and west stand roofs and girder sections were created using the Axial Sweep method. Only one girder required modelling, and was then repeat-copied into position.

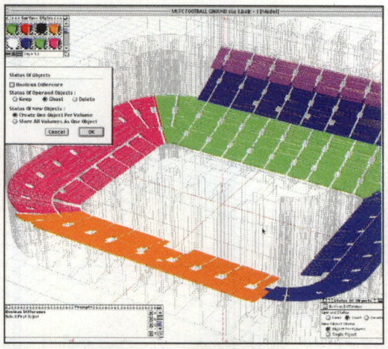


6 The north stand girder sections were again swept. It's a good idea to check how many points are being swept. For example, if each tube contains 50 polygons, a single girder may contain 1200 polygons.



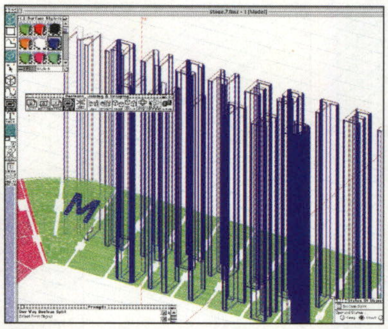
7 Once the wall sections have been created with the Extrude tool, it's a good time to check for any stray polygons or badly formed surfaces.

Three: Modelling the interior It's now time to venture inside the theatre of dreams...

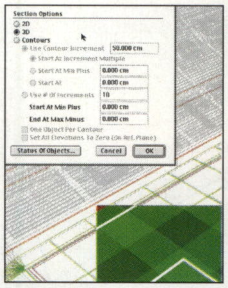


Status Of Objects
☐ Boolean Difference
Status Of Operand Objects :
○ Keep ● Ghost ○ Delete
Status Of New Objects :
● Create One Object Per Volume
○ Store All Volumes As One Object

① After the seat profiles were sweeped, extruded objects were used to Boolean the holes and walkways from the master model (Difference tool).

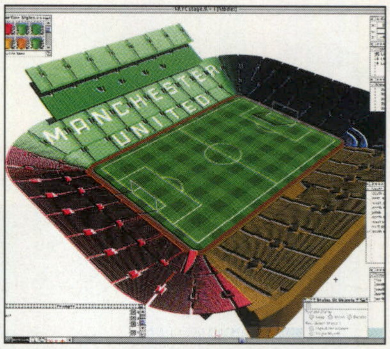


② To create the Manchester United name within the seats, an extruded text model was placed through the seats. Then, using the Split tool, the letters were individually 'split' from the seat model.



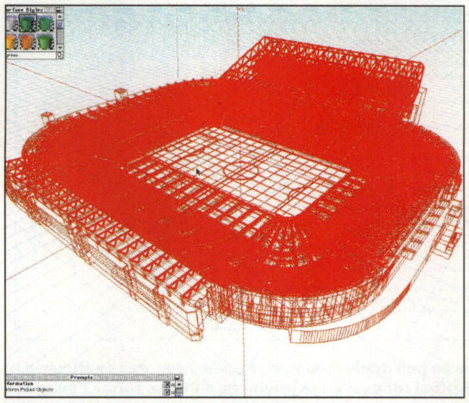
Section Options
○ 2D
● 3D
○ Contours
● Use Contour Increment 50.000 cm
● Start At Increment Multiple
○ Start At Min Plus 0.000 cm
○ Start At 0.000 cm
○ Use # Of Increments 10
Start At Min Plus 0.000 cm
End At Max Minus 0.000 cm
☐ One Object Per Contour
☐ Set All Elevations To Zero (On Ref. Plane)

③ The squares of grass were cut out of a solid pitch model using a vertical 3D surface & the 3D Section tool. You could also do this using the Split tool.

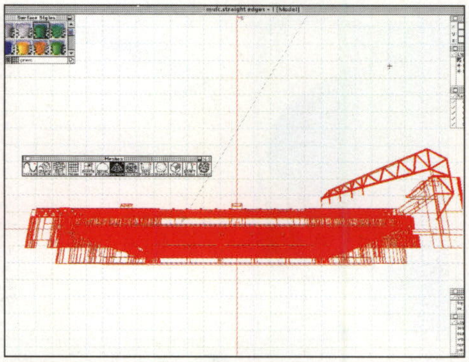


④ Once all the stadium entrances have been modelled, a final test render is produced to check model quality, before the interior is combined with the exterior.

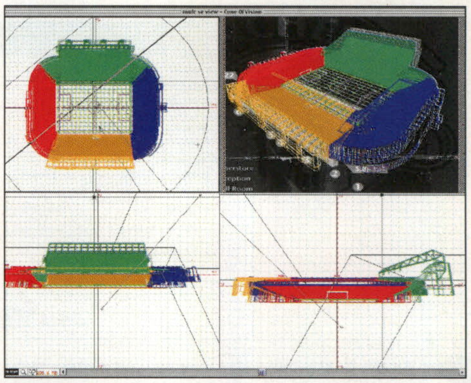
Four: Finishing the model, views, surface & lights Here's how it's done...



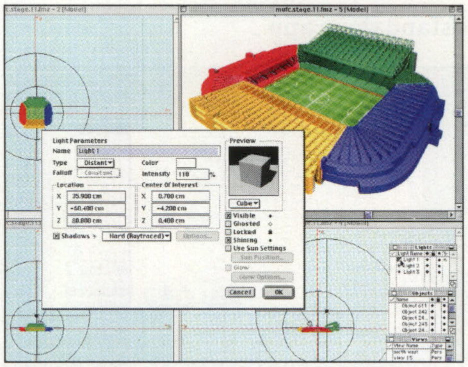
① As the two models have been created at the same scale, you can simply copy and paste the interior into the exterior model.



② Difficulties were encountered when Liddell's artists came to match the *form•Z* view to the view supplied, due to the vertical perspective being too extreme. To overcome this, the entire model was tapered outward towards the base.

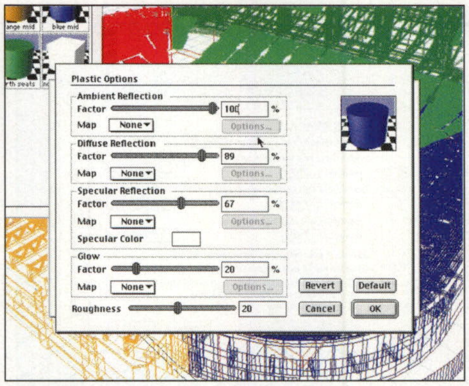


③ The final view was precisely set up using the Edit Cone of Vision function found in the View menu (Command/Control+E). A copy of the visual was imported and placed into the 3D window as a guide.



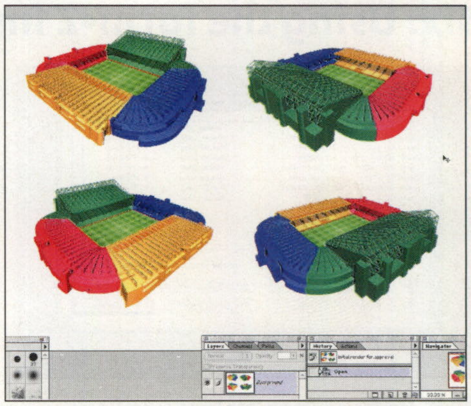
Light Parameters
Name Light 1
Type Distant
Falloff Constant
Color
Intensity 110 %
Location
X 35.900 cm
Y -60.400 cm
Z 80.000 cm
Center Of Interest
X 0.700 cm
Y -4.200 cm
Z 0.400 cm
☒ Shadows Hard (Raytraced)
Preview Cube
☒ Visible
☐ Ghosted
☐ Locked
☒ Shining
☐ Use Sun Settings
☐ Glow

④ The lighting was kept simple using one main light simulating the sun and casting hard-edged shadows. Also, two low-level point lights (with no shadows) were introduced to lighten the shadows being cast on the seats.



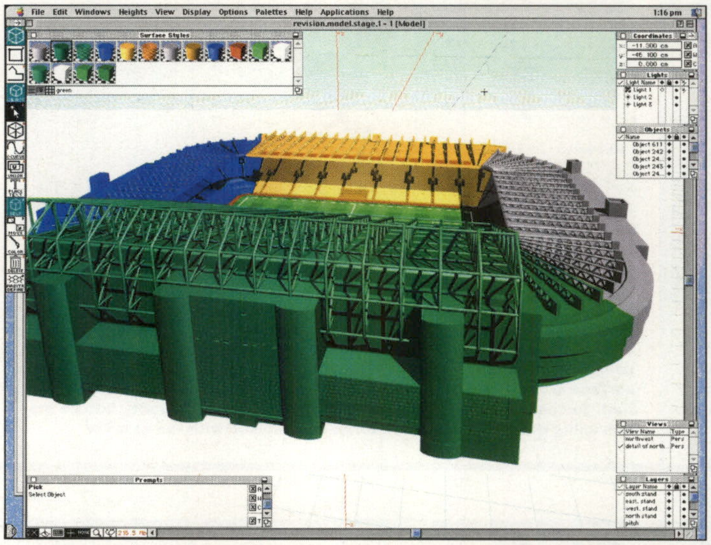
Plastic Options
Ambient Reflection
Factor 100 %
Map None
Diffuse Reflection
Factor 89 %
Map None
Specular Reflection
Factor 67 %
Map None
Specular Color
Glow
Factor 20 %
Map None
Roughness 20

⑤ As the final images required a 'graphic feel', the plastic surface style was used, and a slight glow was applied so that the shadow faces didn't appear too dark.

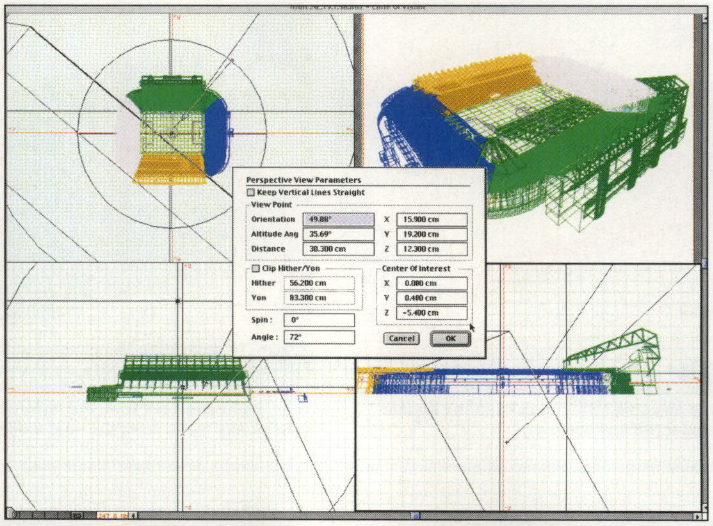


⑥ To finish off, low-resolution renders from the four corners of the stadium were outputted and then sent for client approval.

Five: Amendments & preparation for final renders We're into injury time now...


File Edit Windows Heights View Display Options Palettes Help Applications Help
revision.model.stage.1 - 1 [Model]
1:16 pm
Surface Styles
Coordinates
Lights
Objects
Views
Prompts
Layers

1 Fortunately, client changes were minimal. The west stand was changed from red to grey and more detail was added to the rear of the north stand.



Perspective View Parameters
☐ Keep Vertical Lines Straight
View Point
Orientation: 49.88° X: 15.900 cm
Altitude Ang: 35.69° Y: 19.200 cm
Distance: 30.300 cm Z: 12.300 cm
☐ Clip Hither/Yon
Hither: 56.200 cm
Yon: 83.300 cm
Center Of Interest
X: 0.000 cm
Y: 0.400 cm
Z: -5.400 cm
Spin: 0°
Angle: 72°
Cancel OK

2 In total, eight viewpoints from around the stadium had to be rendered. Setting these up was fairly straightforward as the Altitude, Distance and Cone Angle would stay the same, requiring changes only to the Orientation dialog box.

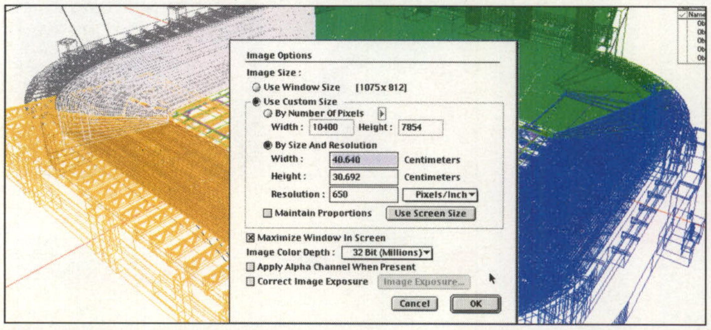
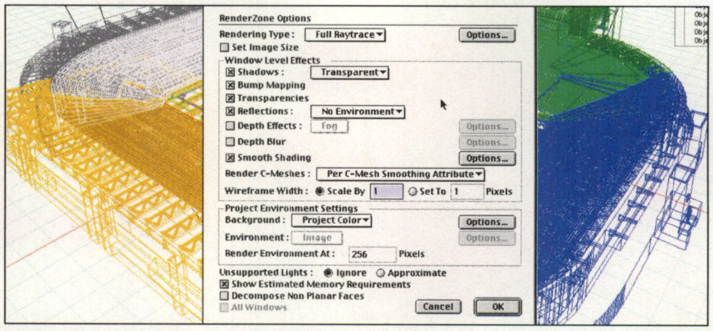


Image Options
Image Size:
○ Use Window Size [1075x812]
● Use Custom Size
○ By Number Of Pixels
Width: 10400 Height: 7854
● By Size And Resolution
Width: 40.640 Centimeters
Height: 30.692 Centimeters
Resolution: 650 Pixels/Inch
☐ Maintain Proportions Use Screen Size
☒ Maximize Window In Screen
Image Color Depth: 32 Bit (Millions)
☐ Apply Alpha Channel When Present
☐ Correct Image Exposure Image Exposure...
Cancel OK

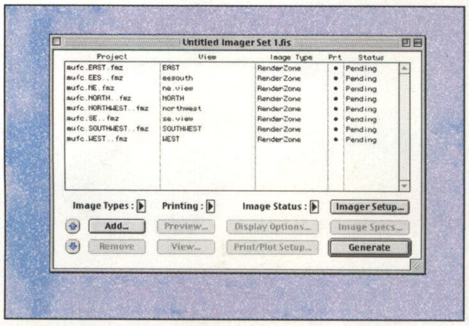
3 As the final printed size was several meters high, Liddell's team purposely over-compensated the final image. They were rendered at 10,800x7854 pixels.



RenderZone Options
Rendering Type: Full Raytrace Options...
☐ Set Image Size
Window Level Effects
☒ Shadows: Transparent
☒ Bump Mapping
☒ Transparencies
☒ Reflections: No Environment
☐ Depth Effects: Fog Options...
☐ Depth Blur Options...
☒ Smooth Shading Options...
Render C-Meshes: Per C-Mesh Smoothing Attribute
Wireframe Width: ● Scale By 1 ○ Set To 1 Pixels
Project Environment Settings
Background: Project Color Options...
Environment: Image Options...
Render Environment At: 256 Pixels
Unsupported Lights: ● Ignore ○ Approximate
☒ Show Estimated Memory Requirements
☐ Decompose Non Planar Faces
☐ All Windows
Cancel OK

4 Each view was saved as an individual model, so *RenderZone* was configured prior to the final save. The final renders were produced with the *form•Z Imager*.

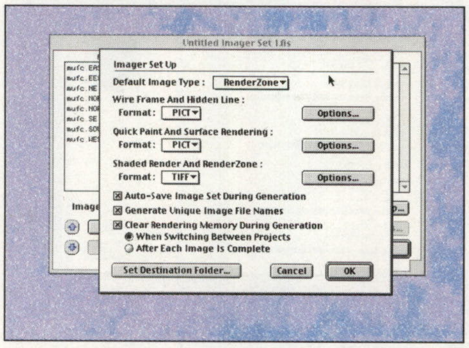
Six: Using the form•Z Imager Here's how to get to grips with this standalone app...



Untitled Imager Set 1.fis

Project	View	Image Type	Prt	Status
mufc.EAST.fmz	EAST	RenderZone	•	Pending
mufc.EES..fmz	eesouth	RenderZone	•	Pending
mufc.NE.fmz	ne.view	RenderZone	•	Pending
mufc.NORTH..fmz	NORTH	RenderZone	•	Pending
mufc.NORTHWEST..fmz	northwest	RenderZone	•	Pending
mufc.SE..fmz	se.view	RenderZone	•	Pending
mufc.SOUTHWEST..fmz	SOUTHWEST	RenderZone	•	Pending
mufc.WEST..fmz	WEST	RenderZone	•	Pending

1 *Imager* is a standalone batch renderer for *form•Z*. Each model to be rendered is added using the Add button. All views, render and image size information are retained from *form•Z*.



Imager Set Up
Default Image Type: RenderZone
Wire Frame And Hidden Line:
Format: PICT Options...
Quick Paint And Surface Rendering:
Format: PICT Options...
Shaded Render And RenderZone:
Format: TIFF Options...
☒ Auto-Save Image Set During Generation
☒ Generate Unique Image File Names
☒ Clear Rendering Memory During Generation
● When Switching Between Projects
○ After Each Image Is Complete
Set Destination Folder... Cancel OK

2 Using the *Imager* Setup dialog box, the final destination folder and file format is selected. *Imager* is then activated with the Generate button.

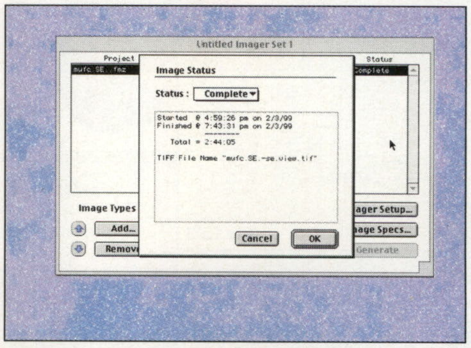


Image Status
Status: Complete

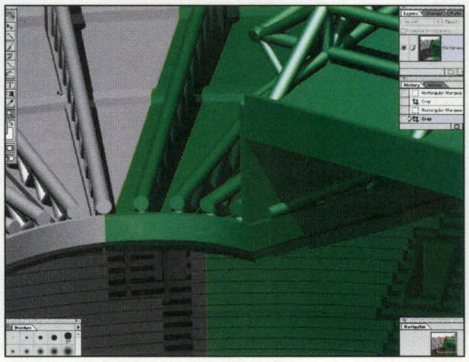
```
Started  @ 4:59:26 pm on 2/3/99
Finished @ 7:43:31 pm on 2/3/99
           --------
    Total = 2:44:05

TIFF File Name "mufc.SE.-se.view.tif"
```

Cancel OK

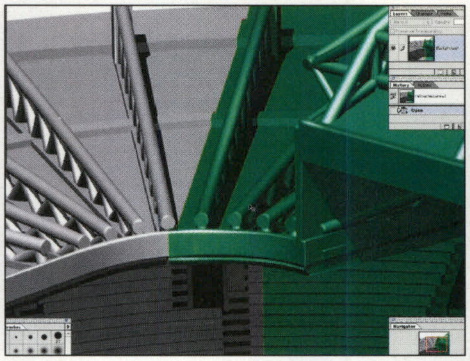
3 Once *Imager* has completed the task, it's worthwhile to check the render times in case of urgent re-renders. You do this by clicking on Complete.

Seven: Retouching final images

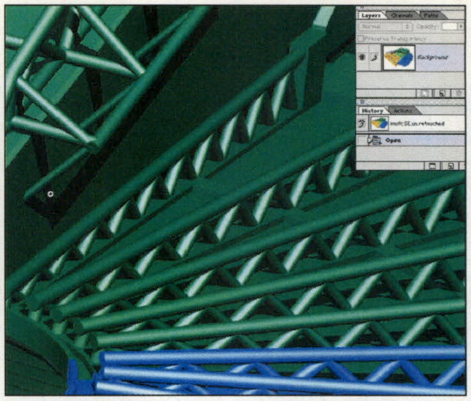
Some of the crowd are on the pitch. They think it's all over...



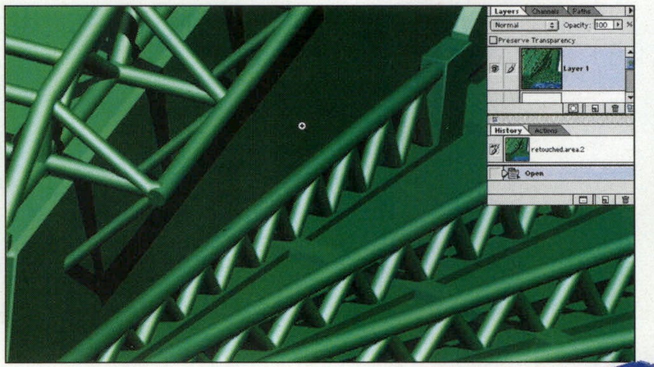
① Once all the high-resolution renders have been created, each image is retouched. The image above is a detail of the basic render before retouching was begun.



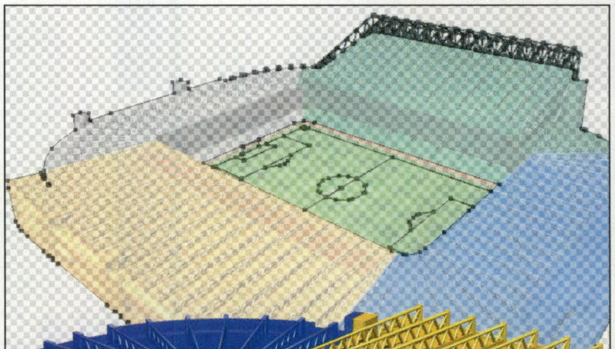
② The retouching process is subtle. Highlights are added along all the hard edges, and selections from paths are created for the longer curved areas. The rest are applied *FreeHand* using a Wacom tablet.



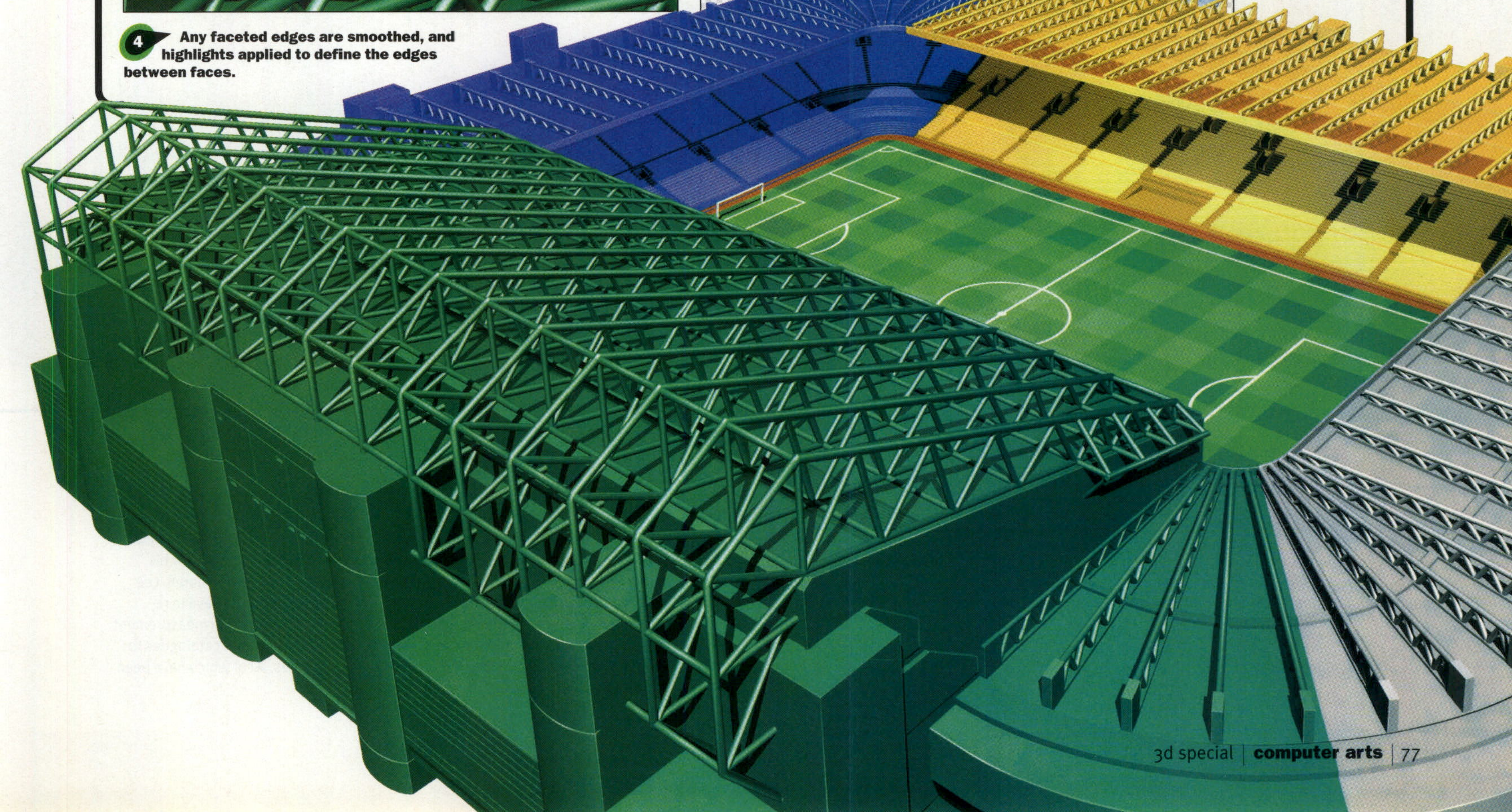
③ To highlight the finishing touches, here's another example of the untouched render.

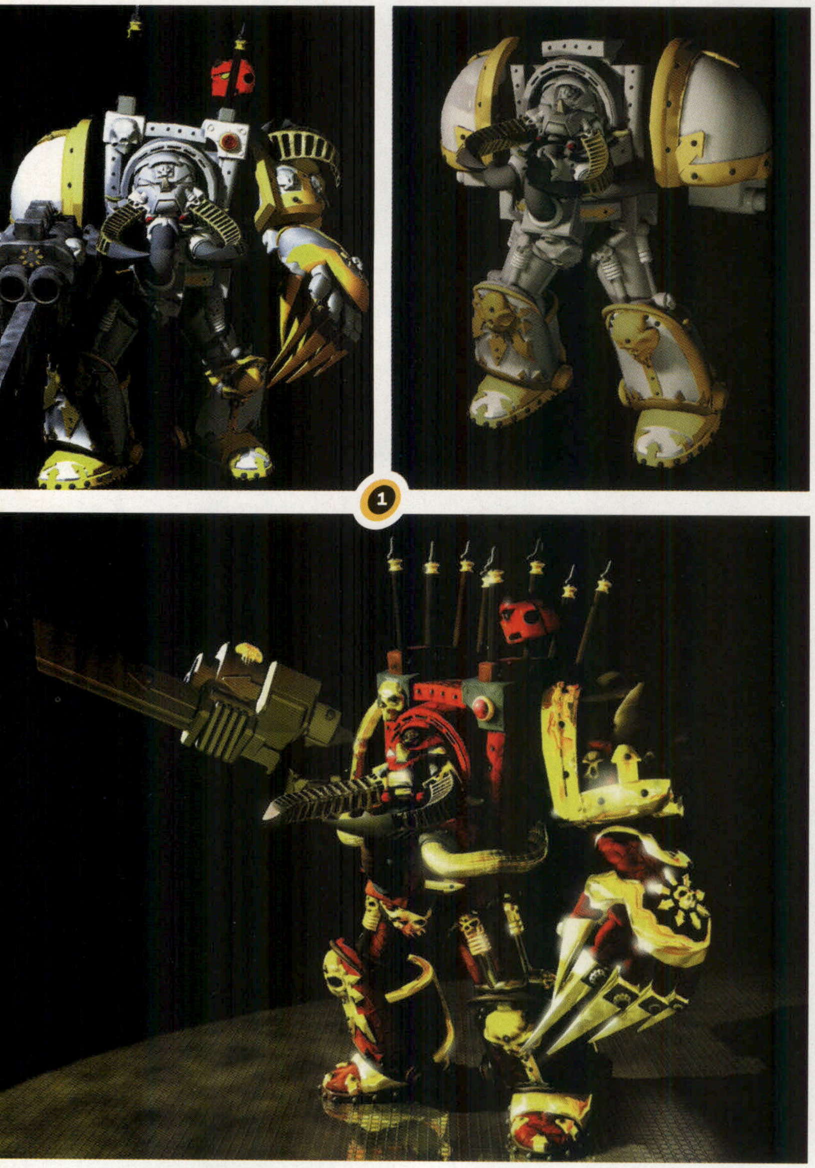


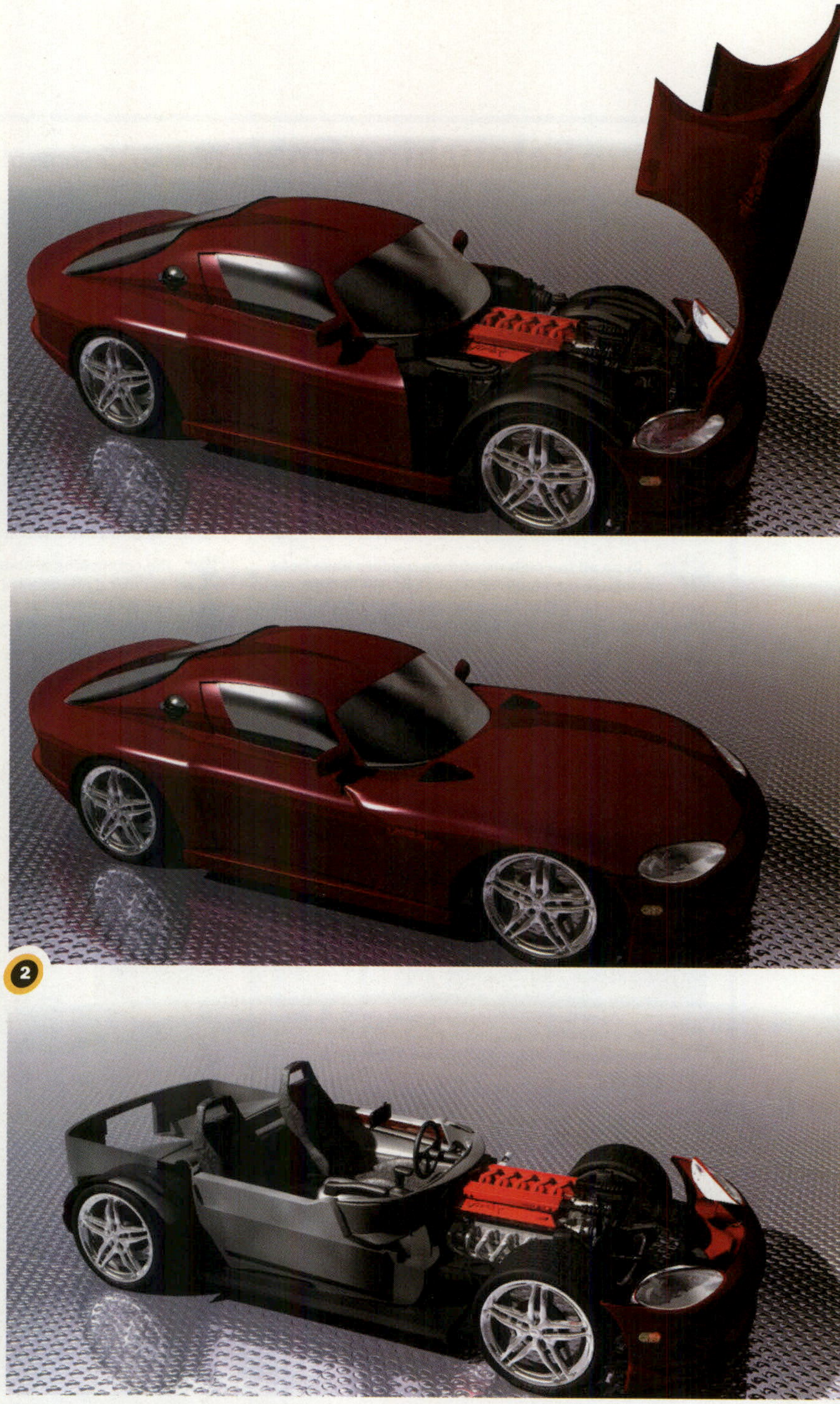
④ Any faceted edges are smoothed, and highlights applied to define the edges between faces.



⑤ Finally, a clipping path was drawn around all eight images. This included the pitch, as it's removed on the printed signage. There you have it – the Red Devils' home on your desktop. **ca>s**




1


2

ca s02

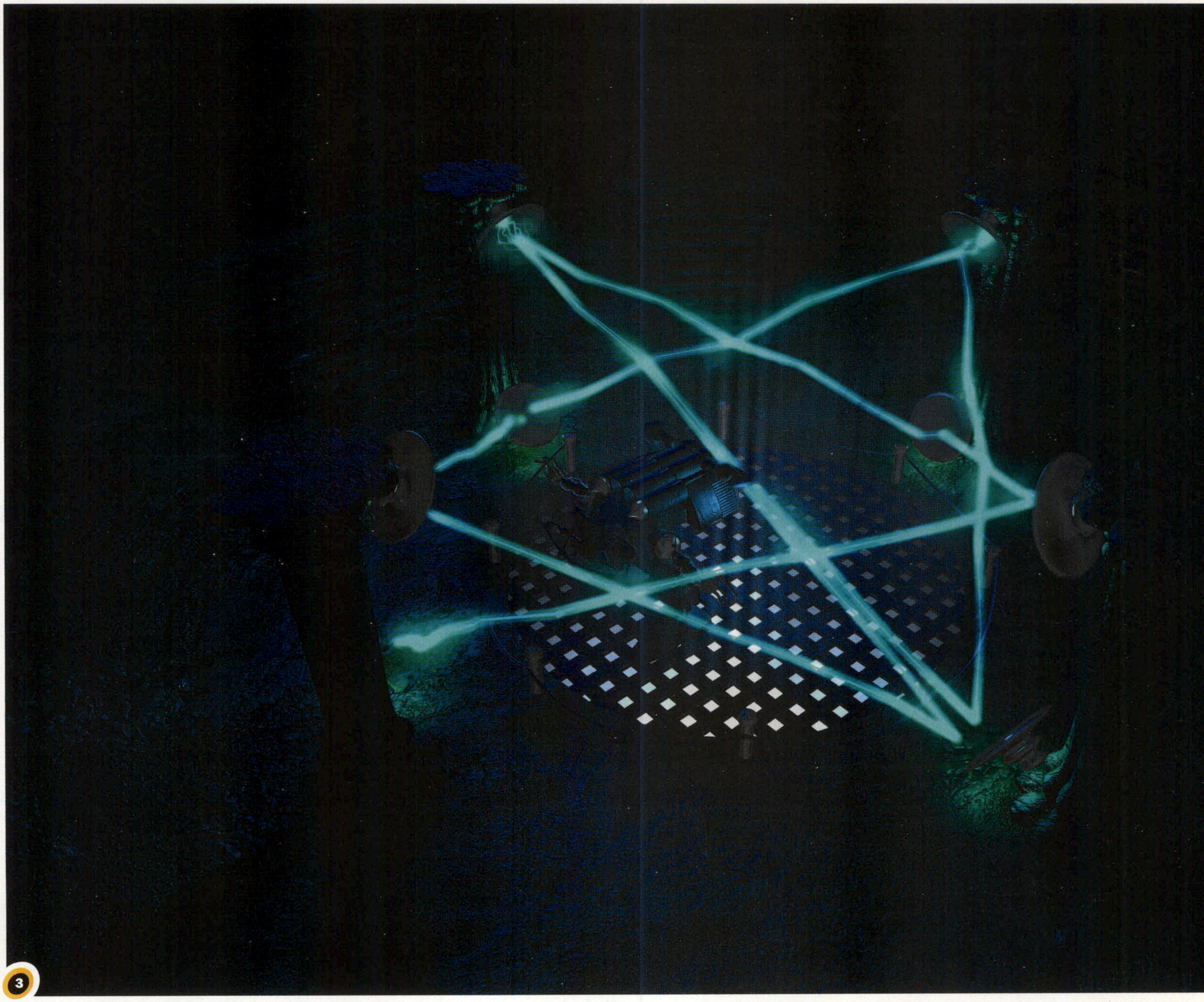
exposure

Feast on a showcase of 3D art from *Computer Arts* readers

1 The Androca Directive (above left)

Lee Perry-Smith t 0181 386 0742

Lee has been interested in computer art since the age of ten, and over the last nine years he's graduated from an archaic Vic 20 to a twin Pentium Pro 200 with 128Mb RAM and two 4Gb hard drives. Lee is inspired by science fiction, and particularly by the company Games Workshop. It produces metal miniatures for table-top gaming and Lee uses these as the basis for his artwork. 'The Androca Directive', like all of his images, started with a self-made model. Lee says, "I don't believe in snatching other peoples computer models, but I do believe in re-creating other people's designs in accurate detail." To this end, Lee uses careful measurement of the metal miniatures, scanning model parts of vehicles and blueprints from catalogues to build his models. He has over 50 different figures, vehicles and scenes, all of which have been created in *LightWave 5.5* with *Autodesk Animator* and *Photoshop*.


3

2 Dodge Viper

James Hans e xedos@dial.pipex.com

James runs his own business offering custom modelling for film and TV, even though he is still in the second year of his degree in computer animation at Bournemouth University. At the tender age of 20, James has an impressive client list with names such as Newtek and Digital Processing Systems, and he is also currently co-writing and illustrating a book on computer animation. James has been using *LightWave* for the past five years, and he owns a render farm and a dual processor PC with a Wacom Intuos tablet. All of his models are started from scratch. James says, "I research the object in question as thoroughly as I can; with the Viper I bought a kit model and photographed the real car." As James builds the kit, he mirrors the process in *LightWave*. On the 'Dodge Viper' images he also used the plug-ins *ShaderMan2*, *Realitools* and *Gaffer*. You can check out more of James' work on his Website at w www.hass-services.com

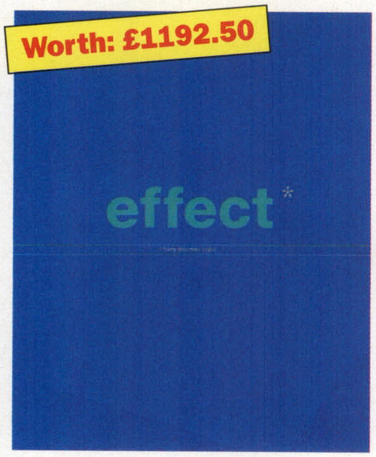
3 Escape (previous page) and Incarcerated (above)

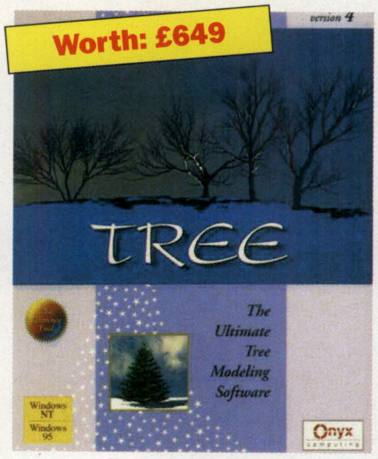
Abdul Gamiet t 01753 576 419 or e magmiet@vossnet.co.uk

Abdul has just finished his degree at the University of Hertford where he studied Software Systems for the Art and Media: he specialised in 3D modelling and 3D animation. Both of these images were rendered entirely in *3D Studio MAX* and not retouched at any stage. Although he chose the 3D modelling route, he still does a lot of freehand sketching with his graphics tablet.

His work is influenced by what he calls the 'modern culture' – a combination of of science-fiction, film and the computer games industry. Films such as *Blade Runner*, *Star Wars*, and film soundtracks by John Williams and John Barry influence his work strongly, as does the work of HR Giger. Abdul works for Soho-based design and multimedia agency Tapestry, where he renders, creates and manipulates images. His company's clients include such well known names as P&O, Carlsberg, Rolls-Royce and Jaguar.words ca>s

Win a Fantastic





With 3D video composition, clip animation and visual effects, *effect** enables artists to combine, enhance and modify video images and clips with a level of efficiency and interactivity never before possible on a desktop system.

With *effect**'s full resolution independence, digital artists become directors of moving pictures on Mac, Win 95 and NT platforms. Providing Discreet Logic visual effects software to more creative and entrepreneurial personalities, *effect** encourages and enables individual innovation, experimentation and achievement to independent artists, boutiques, studios, animation and post-production houses.

Features include:

- 3D compositing
- Unlimited layers
- Animated camera and lighting control
- Advanced texturing (like raytraced shadows, reflections, and transparent/refractive layers)
- Sophisticated blue/green screen keying controls
- Wide variety of expandable plug-in special effects
- Integration with *3D Studio MAX* via depth and surface info in RLA files
- Motion tracking and stabilising
- Real-time playback from RAM
- Multi-processor support
- Advanced tracking function, which enables position, scale and rotation tracking.

Interactive vector-based and object-oriented technology equip *paint** with unique tools for enhancing multi-frame clips and single-frame images on the Mac, Win 95 and NT.

Mixing flexibility and functionality, *paint** enables animators, digital artists, videographers, Website designers, and multimedia specialists to create powerful desktop solutions.

*paint** can create and animate paint strokes, geometry, text, selection objects and effects, while also maintaining full control over their individual properties. The advanced text creation and editing features enable the manipulation of words and characters as vector-based objects. A full set of keyframable effects, as well as the ability to use industry-standard plug-ins is also included.

Features include:

- Unlimited resolutions and professional quality anti-aliasing for broadcast quality output
- Display controls include multiple Project windows per clip, filmstrip, and safe zones for video and titling
- Full integration with *3D Studio MAX*
- Native *paint** project files can be imported directly into *3D Studio MAX* for use as texture maps
- Multi-processing support
- Real-time playback from RAM
- Advanced tracking function, which enables position, scale and rotation tracking providing precise motion analysis and image stabilising.

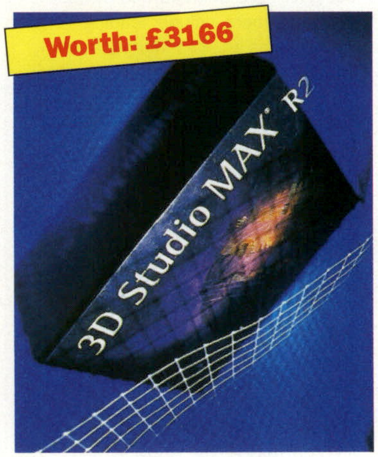
Natural modelling requires specialised software, and *Tree* is the unique modeller that enables you to create biologically-accurate broadleaf conifer and palm trees, as well as bushes and fictional creations. The program implements a powerful modelling technique, which uses pre-recorded knowledge about the anatomy and growth of trees as its modelling ease.

With *Tree*, you model a tree by manipulating its essential characteristics (parameters) such as the height, the curvature and density of branches, and the type and colour of leaves. Each adjustment is recorded on the model instantly so that you have full awareness of changes during modelling. Previews are in linear, wireframe, or full-shading rendering mode.

Marvellously detailed

Working as a plug-in for *ElectricImage* on Mac and *3D Studio MAX* on Windows platforms, *Tree* enables you to alter wind and structural parameters within the modelling environment, or import models built with the Tree Painter modeller. 3D models can be exported as DXF files, which carry 3D geometry and colour information on up to eleven structural layers. This means that *Tree* is compatible with almost any 3D-animation program available for any platform. The DXF dialog enables you to adjust the detail and resolution of the model, thus effectively controlling the polygon size of your trees. A marvellously detailed and practical plug-in application!

software bundle worth = £6200!



WIN *3D STUDIO MAX* AND PLUG-INS, *PAINT, *EFFECT** AND *TREE*, COURTESY OF BIT UK**

In the world of 3D modelling and animation on the PC the popularity and power of *3D Studio* has meant it has developed legendary status. It's been around in one form or another for more than six years, and has established itself as a firm favourite with game developers, professional artists and film animators alike.

MAX – first released in 1996 – was a completely redesigned version, and has steadily developed to incorporate new features and capabilities such as NURBS modelling, full raytracing with a Materials Editor, particle systems, Inverse Kinematics and weighted morphing. The *R2* update alone included a staggering 1000 new features.

You can get a full feature-set and examples from developer Kinetix's Website at **w** www.ktx.com

The *Computer Arts* review of *3D Studio MAX R2* saw a maximum five stars awarded, and it was hailed: "Indisputably the greatest 3D package ever". With these plug-ins you can extend its capabilities to give yourself the finest 3D set-up imaginable…

The competition

All of these plug-ins work with…
A – *3D Studio MAX*
B – *PlayStation Max* magazine
C – Max Bygraves

To enter

Try the easy way via the Web:
1) Insert the 3D Special CD
2) On the Contents screen, click 'Current Compo'
3) Put '3D Studio MAX compo' as the competition name, fill in the form and click 'Submit Entry'

If you don't have Web access you can send a postcard to:

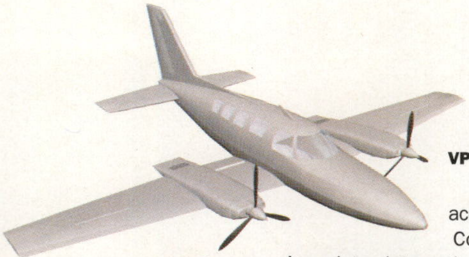
3D Studio MAX competition
Computer Arts Specials, Future Publishing, 29 Monmouth Street, Bath, BA1 2DL

Remember to include your address and a daytime telephone number if possible.

The rules

Closing date for all entries is 8th June, 1999. Employees of Future Publishing, BIT UK, or their agents or their families may not enter. No multiple entries can be accepted. The editor's decision is final, there are no cash prize alternatives, and no other correspondence will be entered into.

Models from Viewpoint



VP1043 Cessna

JUST IN CASE YOU MANAGED TO MISS IT, VIEWPOINT DATALABS HAS KINDLY SUPPLIED YOU WITH TEN FREE WIREFRAME MODELS. HERE'S THE BACKGROUND ON THE COMPANY, AN OUTLINE OF SOME WAYS YOU CAN BUY FURTHER MODELS FROM IT, PLUS SHOWCASES OF ARTISTS USING VIEWPOINT-MADE WIREFRAMES...

Viewpoint DataLabs has a mission: to accelerate the development and expand the use of 3D in communication, education and entertainment by providing the definitive source of quality 3D digital content, services and software solutions.

It's now the creator and publisher of the world's largest and fastest growing library of 3D digital content. The company's unparalleled 3D library and acclaimed modelling services are widely recognised as the industry-standard for professional animators and designers needing a broad and accessible source of quality 3D graphics for creative projects. Through its recent expansion into software development and distribution solutions, Viewpoint provides creative professionals with complete 3D technology solutions that enable easier and more efficient digital content development.

As well as all that, Viewpoint is also driving the future of 3D in the mainstream with *LiveArt*, its graphics productivity software. *LiveArt* makes it easy for authors of everyday business and personal communications to visually enrich their messages with 'living' art and illustration.

In 1998, Viewpoint and 3Name3D – a leading 3D design and production firm – joined forces, following their acquisition by Computer Associates International Inc. The company, operating as Viewpoint DataLabs, serves customers from its offices in Los Angeles, San Francisco, New York, Utah and now the UK.

Customers & partners

Viewpoint provides comprehensive creative solutions that meet the diverse needs of its customers in thousands of companies– from designers and animators to CEOs.

Customers include: leading corporations such as Microsoft, Intel, Boeing, Lockheed Martin and General Motors; plus major entertainment studios including DreamWorks SKG, PDI, Centropolis and Digital Domain. Also on the client list are broadcast companies including NBC, ABC, CBS, Fox and CNN; leading game developers such as Electronic Arts, Sierra On-Line, Psygnosis and Activision; advertising agencies including BBDO/Detroit, Saatchi & Saatchi/LA, and Team One Advertising; plus government agencies and a range of other companies.

Viewpoint's latest work can be seen in the high-profile feature films *ANTZ*, *Armageddon*, *Godzilla*, and *Prince of Egypt*. You can also find it in characters and props for game and multimedia titles including: *Flight Simulator*, *Abe's Oddysee* and *Civilization: Call to Power*; television programs such as *Star Trek Voyager* and *Jonny Quest*; advertisements for Dodge, Taco Bell and Toyota; plus 3D-

Over £2000 of free models!

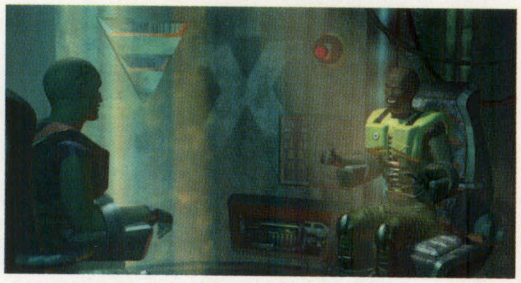
On the CD are ten free models supplied by Viewpoint DataLabs. If bought individually, the total value of the models is £2420.

VP1403 Dodge 32
VP1406 Chevy Bel Aire Convertible 57

Case study: Rage's The Expendable

A Viewpoint-jointed man lends realism to this game's characters...

The Expendable's rendered sequences were created using *3D Studio MAX R2.5* running *Character Studio 2.0*. A number of Viewpoint models were imported where detailed, real life objects were needed. These included foetuses, a skeleton and, most prominently, a male human used for the main character. This needed to look fairly naturalistic, while also being capable of broad, cartoon-like movements.



"VP3613 Man 3 Jointed from the Gold Library was chosen because it provided a high polygon count, together with adequate geometry in all potentially visible areas of the mesh," says Rage's Cathy McBurney. "This was important, as the character would be naked in many of the shots and could be seen from all angles. Since a seamless mesh was desirable, the parts of the model were welded together, leaving only the head separate for facial animation using morph targets."

The model also provided a basis for creating the character's uniform. The trousers were made by directly editing the legs, and the armour built using the torso as a guide so it would be proportionally correct.

Clothed versions were done by face mapping materials directly onto the character. The convenient arrangement of polygons in the mesh facilitated the creation of gloves, bandages and circular hems around the clothing. "Using the Viewpoint catalogue proved to be a huge advantage in all aspects of character creation," confirms McBurney.

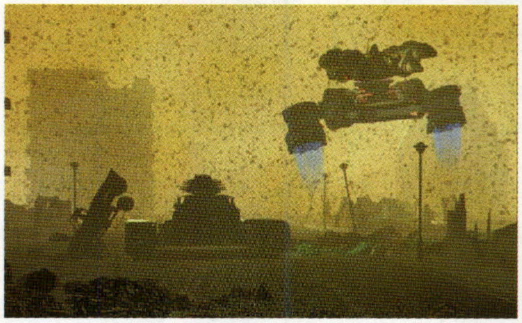
Case study: Pumpkin Studios – Warzone 2100

This PC and PlayStation action game was created using Viewpoint models...

Throwing out the old 2D isometric perspective makes *Warzone 2100* a dynamic game: players can rotate and zoom the camera, and even set it to follow military units as they move across the map. The game uses true line of sight, offering a real sense of movement and exploration as you drive over a hill and discover an enemy base hidden behind it. Graphically, *Warzone 2100* is stunning: there are coloured lighting effects, explosions and debris everywhere when the action heats up – which it does regularly.

Pumpkin Studios licensed Viewpoint's complete Gold Library of low-to-medium resolution 3D models to use in hundreds of pre-rendered background scenes and props. Having these elements at its immediate disposal enabled the development team to focus its time and talents on the more detailed 'stars' of the gameplay.

"Basically, we found this saved us significant time in the use of what we call 'props' in our scenes," explains Pumpkin Studios Director of Development, Nick Cook. "The cost of our Viewpoint Gold Library was quickly recuperated in terms of the time it saved our modellers having to produce these elements. By using the Gold Library, we've been able to get on with modelling and developing the more 'fun' stuff. Viewpoint has been a very useful additional member of the team!"



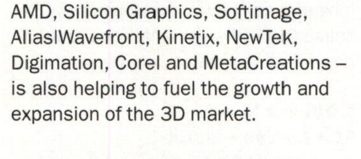
enabled Websites for Sharper Image, Autobytel and Ticketmaster.

Viewpoint's technology partnerships and bundle agreements with leading 3D hardware and software companies – including Microsoft, Intel, AMD, Silicon Graphics, Softimage, Alias|Wavefront, Kinetix, NewTek, Digimation, Corel and MetaCreations – is also helping to fuel the growth and expansion of the 3D market.

Products & services

Viewpoint creates and markets high quality, technically accurate 3D models that operate with most commercial 3D animation software for professional animators, designers and developers of 3D digital content. Its 3D model archive now contains more than 20,000 3D digital objects, including an extensive selection of polygonal, NURBS and real-time 3D models – many with photo-realistic texture maps.

> *"Viewpoint's wide 3D library and acclaimed modelling services are widely recognised as the industry-standard for professionals..."*



VP8293 Hybrid Daffodil
VP1386 Joshua tree
VP24568 Head female

Viewpoint's Creative Services team provides a full range of custom 3D modelling services including pre-visualisation and conceptual design; digitising and laser scanning; NURBS modelling, high-resolution polygonal modelling and real-time modelling; plus texture mapping, shape interpolation and motion attachment.

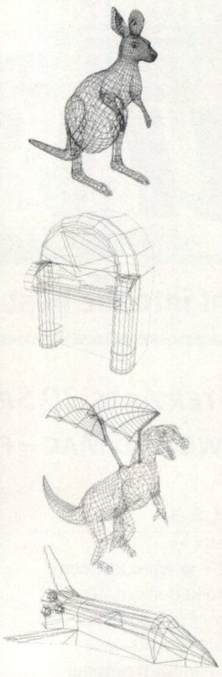
Also on offer is the 'Interchange File Translation System'. This enables accurate translation between more than 40 3D file formats, and provides a comprehensive and productive environment for interacting with, viewing and managing 3D content.

In 1998, Viewpoint announced a global cross-platform initiative to publish and distribute 3D software plug-ins for leading animation systems – including *3DS MAX* and *LightWave* – providing a consolidated resource for the 3D content, creative service and software needs of professionals. Plus, if you're a PC user, *LiveArt* enables you to create and customise illustrations quickly and easily for Websites, printed work or presentations using the power and flexibility of 3D and illustration combined. It also creates images in standard graphic formats for easy import into most programs, and works directly inside Microsoft *Office*.

With the libraries collection, plug-ins, software and production facility, there's a lot more to Viewpoint than simply reams of high-quality models – and it's even more accessible now with the UK base that's just opened. Take a look at what the company can offer you at its Website.

Information

More from Viewpoint DataLabs at
t 01784 451 815 or w www.viewpoint.com

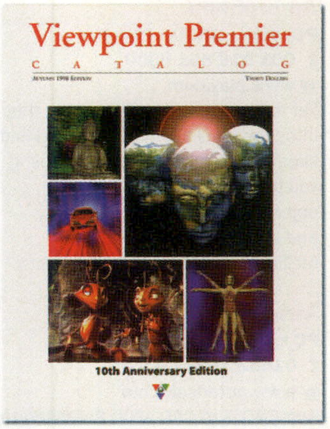


VP22532 Kangaroo
VP8511 Jukebox
VP4009 Dragon
VP5444 Space shuttle

Freedom collections & subscriptions

Along with one-off purchases and library collections, Viewpoint offers flexibility with the 'Freedom' deals...

Get the flexibility you want to create your own collection of models, at price points designed to fit your production budget. If you know exactly what you need today, a Freedom Collection offers tremendous savings over licensing the models individually. If you need more time to choose your models, take up to 12 months with a Freedom Subscription.



How the Freedom Collection works
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3 – You can also include plug-in(s) in your Collection, depending on its size.

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cas02

buyer's guide

Your insight into the best and newest 3D software around – take your pick

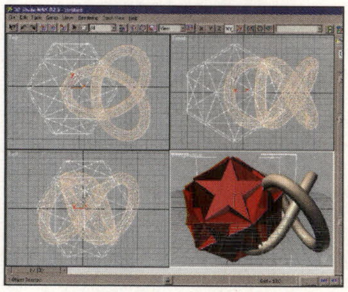
THE *COMPUTER ARTS 3D SPECIAL* GUIDE TO THE BEST AND MOST POPULAR SOFTWARE AVAILABLE FOR WINDOWS AND MAC – FIND WHICH SUITS YOUR NEEDS FROM OUR A-Z LIST...

3D Studio MAX 2.5

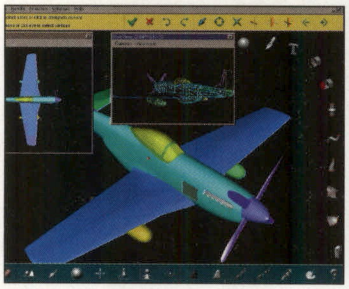
PC ▸ £3166 ▸ Kinetix ▸
t 01483 303 322 ▸ w www.ktx.com
Perhaps the most talked about 3D package in the history of 3D packages, *MAX 2.5* brings designers advanced modelling using non-uniform rational B-splines (NURBS). Priced for professionals, it includes 3D motion tracking and thousands of features used by broadcasters and film effects designers. You'll have seen it at work in productions as varied as *Lost in Space* and *Ally McBeal*. A plug-in architecture has made it one of the most popular 3D modelling and animation programs ever.

3D World 3.0

Mac ▸ £193 ▸ Microspot
t 01622 687 771
w www.microspot.co.uk
Based on Apple's QuickDraw architecture, this modular program is more or less based around the functionality of its plug-ins. These perform various functions from spline-based extrusion to lathing and on to texturing and lighting. It's also easy enough for a 3D novice to pick up.



One of the industry stalwarts, *3D Studio MAX 2.5* is expensive but immensely powerful – but not for the beginner.



Amapi 3D's unusual but intuitive interface has endeared it to many – try the trial of the full software on the CD.

Amapi 3D 4.1

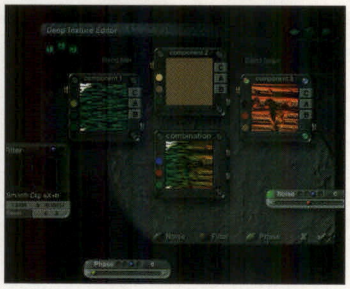
PC ▸ £304 ▸ Gomark
t 0171 731 7930 ▸ w www.tgs.com
Though slightly quirky, *Amapi 3D 4.1* has nevertheless been rated as a major league 3D package. It's a versatile modeller and comes with interesting features such as depth-of-field rendering. It also has a neat 'artistic rendering' option which enables you to render in strange styles, including cartoon mode.

Amorphium

PC/Mac ▸ $200 ▸ Play Inc
t 001 916 851 0800
w www.play.com
Yet to break onto the UK scene, this intriguing package has appeared in the likes of *Time* magazine. By enabling you to effectively sculpt your 3D objects as though they were clay – and in real-time – the program facilitates some unique 3D effects.

AutoCAD 2000

PC ▸ TBA ▸ Autodesk
t 01483 462 600
w www.autodesk.com
AutoCAD is to CAD what *Photoshop* is to photo-manipulation – and this latest version of the program appears with an *Explorer*-style interface. The ability to work on several drawings at once has been added, plus you can drag-and-drop objects between open work windows.



Originally developed solely for rendering landscapes, *Bryce 3D* has become an incredibly popular (and affordable) app.

Bryce 3D

PC/Mac ▸ £210 ▸
Computers Unlimited
t 0181 358 5857
w www.metacreations.com
Best known as a fantastic landscape generator, *Bryce* has come into its own as a sturdy all-round 3D package as well. While it still creates some of the best fantasy landscapes ever seen, it can also more than handle more mundane jobs such as rendering bathroom interiors.

Cinema 4D SE 5

PC/Mac ▸ £549 ▸ HiSOFT
t 0500 223 660
w www.cinema4d.com
Though a cut-down version of *XL*, *Cinema 4D SE* still offers output resolutions up to 16,000x16,000 pixels, which puts its quality well beyond broadcast levels. What's more, it also offers some cool particle and real-time object deformation effects.

Cinema 4D XL

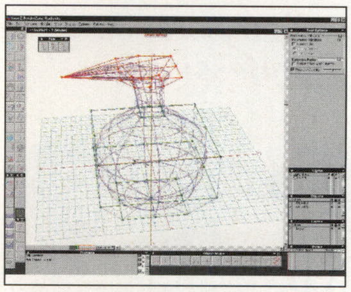
PC/Mac ▸ £1095 ▸ HiSOFT
t 0500 223 660
w www.cinema4d.com
Aimed at pro users, *C4D XL* can take advantage of up to 16 processors, which is great if you have your own renderfarm. Like its little brother, it has an integrated programming language for plug-in development called COFFEE which only adds to its power and versatility.

Cool 3D 2

PC ▸ £34.99 ▸ Bit UK
t 01420 838 11 ▸ w www.bit.co.uk
There are no complex interface buttons or mystifying menus with *Cool 3D 2*, nor any special commands. This program is simple, and its job is to produce 3D titles and headlines. Its main use is for Website creation.

form•Z 3.0

PC/Mac ▸ £1315 ▸ Gomark
t 0171 731 7930
w www.formz.com
Here, you have the ability to combine NURBS, Bézier-based and Coons patch modelling in 2D or 3D to great effect. This renowned package has a



form•Z 3 is aimed more at the technical market with its precise modelling tools – though it has rendering and animation.

customisable interface that you can set up to your specific needs. Add the support packages *RenderZone* and *RadioZity* for a complete *form•Z* suite.

Infini-D 4.5

PC/Mac ▸ £699 ▸ Computers Unlimited
t **0181 358 5857**
w **www.metacreations.com**

Powerful 3D animation program. It's especially good for creating special effects for presentation on video, and is widely used in the American broadcasting industry. Audio syncing, colour-correction and the ability to suspend and resume rendering jobs all add to its appeal to professionals.

Imagine

PC ▸ $695 ▸ Impulse Inc
t **001 702 948 1100**
w **www.coolfun.com**

Originally an Amiga program called *Silver*, *Imagine* has moved onto the PC to become an effective mid-level performer. It's got procedural texturing for common surfaces like wood and brick, plus quick-view render modes.

Inspire 3D 1.0

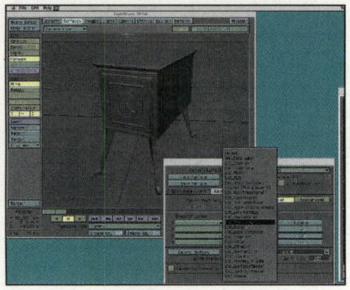
PC/Mac ▸ £411 ▸ AGM FX
t **0171 437 1486**
w **www.newtek.com**

After making a big, big splash with *LightWave 3D*, NewTek set out to publish something a little more affordable. With output resolutions up to 8000x8000 pixels, *Inspire* is nothing to sniff at, while VRML 2.0-compatibility makes it equally good for the Net. The program comes with extensive libraries of objects.

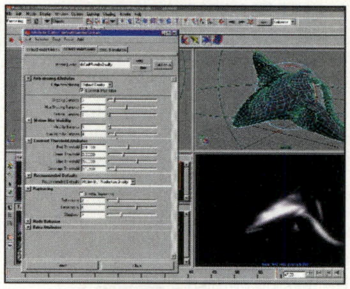
LightWave 3D 5.6

PC/Mac ▸ £1639 ▸ AMG FX
t **0171 437 1486**
w **www.newtek.com**

According to NewTek, *LightWave* is used by over 40,000 digital artists, which is good going for a program at this price. And indeed, it's a massively popular tool for creating special models, animations and effects for television, games and big screen productions. Ignore it at your peril.



Together with *3DS MAX*, *LightWave* is the most popular mid-range 3D package, and is used extensively for film effects.



Recently converted to the NT platform, *Maya NT* is a high-end 3D package that's very at home in Hollywood. La-di-da...

LogoMotion 2

PC/Mac ▸ £93 ▸ Computers Unlimited
t **0181 358 5857**
w **www.metacreations.com**

As the name suggests, *LogoMotion 2* is best at creating flying 3D logos and other text effects. A simple drag-and-drop interface makes an easy path to conjuring up animations, and the program has some interesting lighting and camera manipulation capabilities.

Maya NT

PC ▸ £6991 ▸ Alias|Wavefront
t **01494 441 273**
w **www.aw.sgi.com**

Welcome to the high end, where *Maya*, the latest Wavefront release, is seeing widespread use in creating graphics sequences for television. Advanced features like particle systems, NURBS and polygon modelling tools, inverse kinematics, character skinning and *Maya*'s open ended programming interface, MEL, put this package on the cutting edge.

MiniCAD VectorWorks

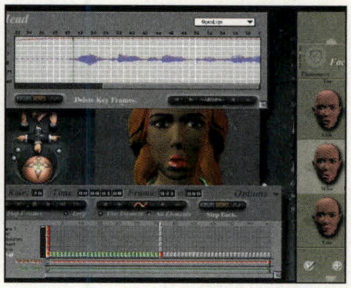
PC/Mac ▸ $795 ▸ Gomark
t **0171 731 7930**
w **www.diehlgraphsoft.com/**

VectorWorks combines 2D modelling and 3D rendering to present a full object-based CAD package. It requires use of a scripting language for full access to its flexibility, and is geared towards architectural, engineering, landscape and lighting design.

Nendo

PC ▸ $99 ▸ Techex UK
t **01628 77 800**
w **www.nichimen.com**

Like one or two other programs, *Nendo* offers a 'digital clay' style environment for the modelling of shapes, as well as 3D painting features. It's meant to be used by pros and hobbyists alike, and is particularly useful for creating Web images and game characters.



***Poser 3* is virtually unique, one of the few human figure posing/rendering programs – and it's excellent too.**

Organica 1.1

PC/Mac ▸ £117 ▸ POW! Distribution
t **01202 716 726**
w **www.coolfun.com**

Metaballs are now widely seen in 3D modelling packages, but *Organica* was perhaps the first app to popularise them. Using the program is more than an artistic experience too, and many users find playing with its digital putty quite addictive. Good results, too.

Painter 3D

PC/Mac ▸ £351 ▸ CU
t **0181 358 5857**
w **www.metacreations.com**

Unlike many other programs here, this doesn't do object modelling. In fact, it doesn't do much 3D. But it does enable you to load in your 3D shapes and use its fantastic set of artists tools to paint textures onto them. Great stuff.

Poser 3

PC/Mac ▸ £210 ▸ CU
t **0181 358 5857**
w **www.metacreations.com**

Poser specialises in the modelling of the human form for export and use in other 3D programs. V3 of the program enables you to articulate limbs right down to digits in the fingers. You can even create and animate animals.

POV-Ray

PC/Mac ▸ Free! ▸ Persistence of Vision
Download only *w* www.povray.org/

POV-Ray stands for Persistence of Vision Raytracer and it's a freeware renderer. You need to have 3D models to render to use the program, however, and for this reason you may want to download the wireframe modeller *Moray* to run alongside it. For more see ***w*** www.stmuc.com/moray/

Ray Dream 3D

PC/Mac ▸ £128 ▸ CU
t **0181 358 5857**
w **www.metacreations.com**

Ray Dream 3D is a comfortable entry-point to the third dimension – and it even features modelling and scene creation wizards to boost its ease of use. Keyframe animation also includes the ability to drag-and-drop properties such as 'bounciness' onto objects, before setting them in motion.

Ray Dream Studio 5

PC/Mac ▸ £351 ▸ CU
t **0181 358 5857**
w **www.metacreations.com**

More or less the big brother of the above, *Studio* is a powerful but cost-effective application for professionals. Its interface is very hands-on, with the ability to deform models as though they were clay; and to drag-and-drop light and camera positions in scenes.

RenderMan

PC ▸ $8500 ▸ Pixar
t **001 800 888 9856**
w **www.pixar.com**

Ever heard of *A Bugs Life*? How about *Toy Story*? And *Jurassic Park*? Well, *RenderMan* was the proprietary software used to create the graphics and effects in these blockbusters and Pixar (the production company involved with all three films) also sells the software. If you want to know what it can do, watch one of the films.

Rhinoceros

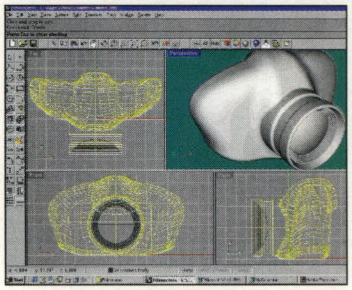
PC ▸ £586▸ Aztec CAD Ltd
t **0171 987 6543**
w **www.rhino3d.com**

Rhino's a little known app making a name for itself thanks to its excellent NURBS modelling capabilities. It's great for turning sketches and ideas into full 3D models ready for rendering.

Simply 3D 3

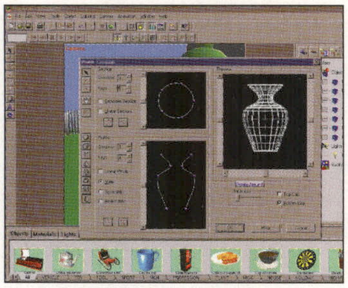
PC ▸ £80 ▸ Micrografx
t **01483 747 526**
w **www.micrografx.com**

This is a great program to start off with in 3D. It's ideal for creating 3D



A cross between a CAD package and a conventional 3D modeller, *Rhino* is quickly gaining fans for its versatility.

⇒



For an affordable 'low-end' package, *Simply 3D* is remarkably good, especially for learning 3D concepts and methods.

graphics for the Web, multimedia or *PowerPoint* presentations. Despite its low-end appeal, it has a full raytracing engine and enables you to work in a dynamic, real-time environment.

Softimage|3D 3.8 Extreme

PC ▸ £13,512 ▸ Softimage
t 0171 632 5652
w www.softimage.com

Polygons, patches, NURBS and metaclay modelling are all supported by *Softimage*. It's found particular fame in the games industry, and is used on a widespread basis for the creation and animation of game characters. Programmers invariably recommend it.

solidThinking 3

PC ▸ $1495 ▸ Grestel
t 0039 0444 99 11 00
w www.solidthinking.com

Specialising in NURBS modelling, *solidThinking* is a serious application with a range of professional-level features. New tools appear including 'Round Surface Intersection', 'Surface Blend' and 'Edge Abstraction'. It also includes a plug-in development kit.

Strata StudioPro 2.5.3

PC/Mac ▸ £1103 ▸ Principal Distribution
t 01756 704 000
w www.strata.com

One key feature of Strata *StudioPro* is its rendering speed – but it also boasts an array of effects. The particle handling makes it good for smoke, waterfalls and pixie-dust, and it does depth of field rendering and motion blur. A highly respected package.

Strata Vision3D 5.0

Mac ▸ £180 ▸ Principal Distribution
t 01756 704 000
w www.strata.com

Powered by Apple's QuickDraw technology, Strata *Vision3D* gives you workstation-like performance on an ordinary Mac. Phong, raytracing and Strata's own Raypainting rendering systems all feature, with the usual array of modelling and rendering tools.

trueSpace 3.0

PC ▸ £315 ▸ Caligari
t 0118 982 9826
w www.caligari.com

At the core of *trueSpace 3.0* is a powerful raytracing renderer, though the program is also designed for NURBS modelling and keyframe animation. Special features include collision detection, the ability to paint textures directly onto 3D models, inverse kinematics, plus skinning and plastiforming.

trueSpace 4.0

PC ▸ £475 ▸ Caligari
t 0118 982 9826
w www.caligari.com

trueSpace 4.0 offers all the key features of version 3.0 and then some. Radiosity lighting for those volumetric lighting effects is one of the big ones, alongside adaptive anti-aliasing plus some very nifty shading effects. *trueSpace* is known for having a slightly off-kilter interface – but once you master it, you won't be able to put it down. Check out the cash-saving upgrade offer on page 97.

TurboCAD

PC ▸ £99 ▸ IMSI
t 0181 581 2000
w www.turbocad.com/

This mid-price CAD program incorporates 2D and 3D design capabilities through an easy-to-use interface. The tools are intuitive, and as if to add to that usability, the program even has voice recognition for key commands built-in.

Vista Pro 4

PC/Mac ▸ $69.99 ▸ egames
t 001 215 750 6606
w www.egames.com

This application is capable of taking digital elevation maps (DEMs) and rendering them in order to conjure up stunning 3D landscapes. They can be as realistic or as fantastical as you like. At its core is a fractal landscape generator which enables it to come up with terrains at random. What's more, it's superb fun to use too.

Vue d'Esprit 2

PC ▸ $155 ▸ e-on software
buy on-line w eonsoft.hostme.com/index.htm

Similar to *Vista Pro*, *Vue d'Esprit* was designed with the beginner in mind, and is also a landscape generator. Elaborate lighting algorithms, soft shadows and blurred reflections come together to make the scenery look even more natural. The program is supplied with *SolidGrowth 2*, a vegetation generator.

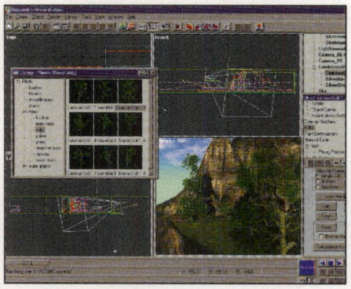
Web 3D

PC ▸ $49.99 ▸ Asymetrix
t 0171 345 1500
w www.asymetrix.com

As the name suggests, *Web 3D* exists to give your Website that extra bit of 3D zip. Use it to design 3D headers, bullets, buttons and other graphics. Plus, a drag-and-drop interface enables you to build 3D Websites with ease.

World Builder 2.2

PC ▸ £793 ▸ Digimotion



***World Builder 2* is a step up from *Bryce*, both in terms of quality and price. It renders landscapes, and it does it well.**

t 0171 287 3510
w www.animatek.com

World Builder is a standalone landscape generating program, but you can also use it as a plug-in for *3D Studio MAX*, *3D Studio VIZ* or *LightWave 3D*. Objects in your 3D scenes can be given animation, and it even boasts a Wind Wizard for the creation of meadows of procedural grass. What more could you want?

World Construction Set 4.5

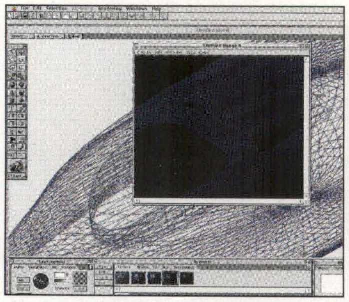
PC/Mac ▸ £699 ▸ Bit UK
t 01420 838 11
w www.questarproductions.com

Yet another 3D landscape creation package, this one comes with a built-in texturing engine. Animated textures are possible and fine-tuning tools include: snowline feathering; wave texturing; specularity in water features; and alpha channels for smoke and rainbow effects.

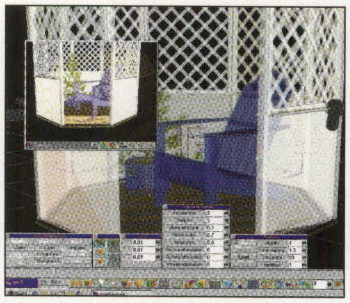
Xara 3D 3

▸ PC ▸ $39 ▸ Xara
order on-line
w www.xara.com

If all you want to do is design 3D banners, headings or icons for Websites there's no need to go the whole hog on an expensive application. *Xara 3D* is designed specifically for that sort of work – and what's more, it's very economically priced too. ca>s



Strata's *StudioPro 2.5* is a mainstay of the Mac 3D market, with good rendering speed and a wide range of features.



***trueSpace 4* has developed from a rather gimmicky package into a much more useful and robust modeller/renderer.**

Get VistaPro 3.0 – FREE!

If you're interested in getting your hands on a powerful landscape generation application but don't want to empty your wallet, keep an eye out for the June issue of our sister magazine, *PC Review*. At £4.99, it comes with two CDs filled with software including *VistaPro 3.0*. You'll find a full tutorial on using the program in the mag, plus a top line-up of games, hardware, multimedia, Net and creative software reviews, and more.

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Information

PC Review issue 95 is on sale from 13th May 1999. More info from **w** *www.futurenet.co.uk*

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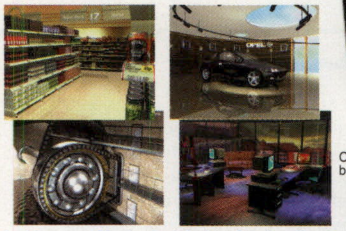

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Alex Shaw, Alex Shaw Art & Design.

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Want to learn 3D Studio MAX ?

Interactive :- These training CD-ROM's are truly interactive and unique, the course tutorial AVI's with expert commentary, are accessed by using the CD-ROM's copy of the program's interface, it actually looks like you're using the program. However if you are looking for a specific function use our help or A-Z function guide. Comprehensive top quality on-demand training without leaving the office. Enhance your skills and knowledge

3D Studio MAX Interactive Training, Volume I :- This CD-ROM is aimed at the first time user and covers 2D & 3D modelling, lofted objects, object modifiers, animation, materials, lights, track view, spacewarps, using dummies and more.
(194 AVI's, Total Time 3Hrs, 44 Min) **ONLY £99 +vat**

3D Studio MAX Interactive Training, Volume II :- This CD-ROM is aimed at the first time, experienced or upgrading user and covers more advanced features including Quad / Tri patch surfaces, motion capture, inverse kinematics, assign controllers, hierarchy and more.
(70 AVI's, Total Time 2Hrs, 45 Min) **ONLY £99 +vat**

3D Studio MAX Interactive Training, Volume III :- This CD-ROM is aimed at the first time, experienced or upgrading user and covers all MAX 2.5 Nurbs features including Nurbs primitives, Nurbs points, Nurbs curves, Nurbs Surfaces and more.
(100 AVI's, Total Time 2Hrs, 47 Min) **ONLY £99 +vat**

3D Studio MAX Interactive Training, Volume IV :- This CD-ROM is aimed at the first time, experienced or upgrading user and covers more advanced features including particle systems, video post, image filters, environmental fog, volumetric fog, volumetric light, and more.
(75 AVI's, Total Time 3Hrs, 06 Min) **ONLY £99 +vat**

Character Studio R2 Interactive Training :- This CD-ROM is aimed at the first time or upgrading user and covers the Biped, physique, motion flow, footstep mode, figure mode, structure, track view and much, much, more. (41 AVI's, Total Time 1Hrs, 22 Min) **ONLY £99 +vat**

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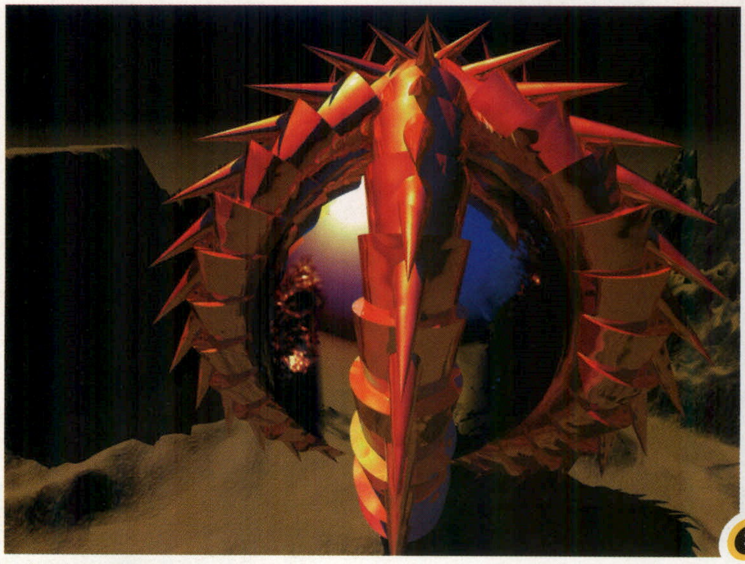
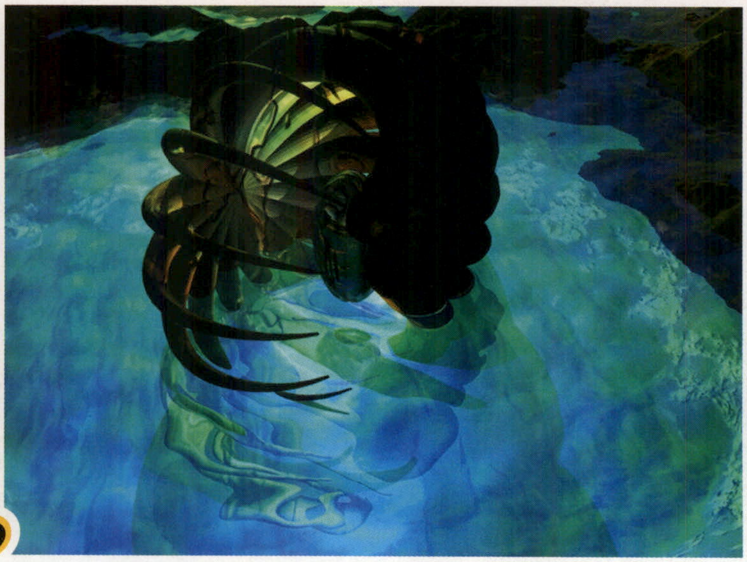
2





1

computer arts special

The definitive guide to mastering 3D • Mac & PC

ca s02

exposure

Feast on a showcase of 3D art from *Computer Arts* readers

1 Spiny and Random Veg (above, top and bottom)

Mark Smith e digitaldrama@home.com

'Spiny' was a cone and sphere primitive made in Alias|Wavefront *Power Animator*. In designing the central figure Mark used a cone and offset its local axis, then cloned it many times, each one rotated slightly until it made a circular grouping of cones. He modelled the clones and exported it as a single polygonal DXF object. It was then imported into *Bryce* to create the sandy dune look. 'Random Veg' is an artwork that came about from an experiment in rendering water. He modelled a single rib-like object and exported it out as a DXF file. He then used *Bryce*'s Multi-Replicate tool to create the spherical ribcage. He placed this within a *Bryce* rendered tidal pool and lit the scene from below and shaded the anemone. The modelling was done on a Silicon Graphics Indigo 2 machine.

Mark is influenced by HR Geiger, William Latham, Yoichiro Kawaguchi and Karl Sims.

3

2 Flying Finish and One Chair (above left to right)

Shane t 04325 361 994 (pager)

Shane has just graduated from Brighton University after studying Three Dimensional Crafts. He specialises in computers and plastics, and then combines the two mediums to create artificial imagery.

His pictures here are part of a series for his degree show which ran earlier this month. The backgrounds were made up of a collage of different pictures scanned in *Extreme 3D*, while the objects are all toys which were also scanned in *Extreme 3D*. He plastered them onto a flat silhouette, extruded them out and then put them into *Photoshop* where he used distortion and lighting effects. He did this with all the elements to create a 'cardboard cut-out' feel.

Shane is interested in plastics, which he sees as the ultimate 3D object because the transparency enables an image to move.

3 Lego (left, top to bottom), Lookout (above) and Island (top)

Matthew Dartford t 01202 316 660

In his final year of an HND in illustration, Matthew's work experience is at Digital Progression, an advertising illustration firm. Matthew is sanguine about his future: "I know there should be a job here for me when I finish college..." He deserves this piece of mind, though, as he uses *Bryce, Poser, 3D Studio MAX,* and *Strata* to create his images. The three 'Lego' pictures were done for a college project on advertising. Matthew scanned in real Lego pieces then traced around them in *Illustrator* to work out the cross-sections and exported these into *3DS MAX* where he created and rendered the figures. For 'Look Out' Matthew formed the components of the image in packages; *Bryce* for the sky, *Poser* for the body, and then "threw them altogether in *Photoshop*." Matthew's favourite 3D program is *Bryce*, he says, "it does exactly what you want. With some of the others, you can sit in front of them for days and get nowhere." ca•s

computer arts special
The definitive guide to mastering 3D • Mac & PC
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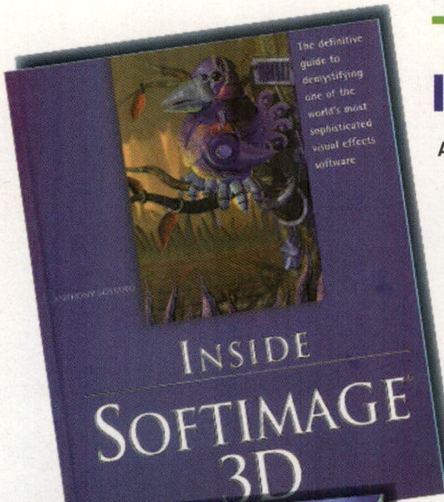
books

Practical guides and droolsome showcases – the latest 3D books


The definitive guide to demystifying one of the world's most sophisticated visual effects software
Anthony Rossano
INSIDE
SOFTIMAGE
3D

Inside SoftImage

Anthony Rossano ▸ New Riders ▸ £70.49 ▸ ISBN: 1-56205-885-1

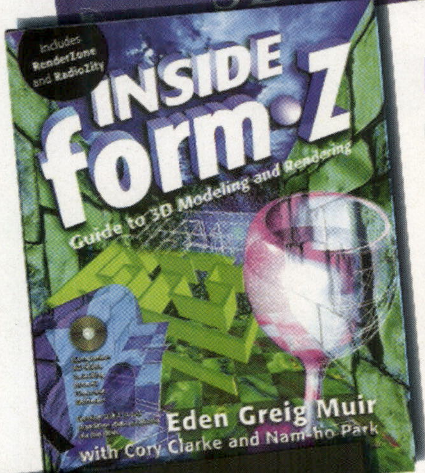
This big, heavy, 700 page hardback on *SoftImage|3D* covers up to version 3.7 of this heavyweight 3D software and takes the reader on a beginner-to-intermediate-level tour of the program. As well as covering 3D basics and features in *SoftImage* the book contains an interesting selection of interviews with prominent 3D artist including Joshua Staub from Cyan (*Riven*) and Thomas Schelesny of Tippet Studios (*Starship Troopers*) with some nice images of work in progress.

On an information level the book was a bit of a disappointment, given the author's qualification as a Level 2 *SoftImage* instructor. There's not a lot in it that isn't covered in depth in the extensive SoftImage manuals.

While the book is in full colour the screen shots of the SoftImage interface are of course grey, and the majority of example renders are in flat colours. For £70 it's something of a visual let down too, there were even glaring production errors with some images in a sequence being cut in half or missing entirely.

The examples themselves, while illustrating a point well are also rather dull. It's a shame that the author hasn't put more effort into inspiring the reader, an essential ingredient in a book of this nature.

"A condensed if rather expensive mini-manual"


Includes RenderZone and RadioZity
INSIDE
form•Z
Guide to 3D Modeling and Rendering
Eden Greig Muir
with Cory Clarke and Nam-ho Park

Inside form•Z

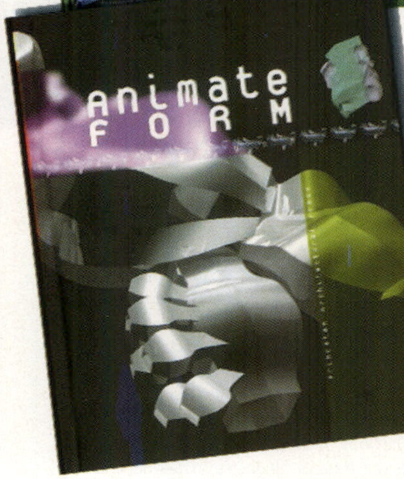
Eden Greig Muir ▸ OnWord Press ▸ £33.95 ▸ ISBN: 156690-182-0

This book aims to cover the entire *form•Z* experience including Modelling, Drafting, Imager, Renderzone and Radiozity. It is well structured but not too formal covering the interface and tools as well as providing exercises and tips over 580 pages.

form•Z is a tricky program to learn, not helped by its terse if comprehensive manuals, and an alternative such as this may well be useful. The exercises, however, are terribly dull, and the bulk of it, explaining *form•Z*'s tools is concise but unnecessary if you already have the manuals. The coverage of the tools was unbalanced, with tricky topics such as Skinning getting the same amount of coverage as, for example the N-sided polygon tool. There's a brief section on the Drafting Module and a handy 50 tips for things you probably didn't know, or knew you needed to know.

The book could go deeper into the complexities of the program, and the tools that really baffle are not covered well enough, which is a shame, but it's good as a general guide to the program, and won't break the bank.

"Coverage of the interface and tools are followed by exercises and tips"



Animate Form

Greg Lynn ▸ Princeton University Press ▸ £28 ▸ ISBN: 1-56898-083-3

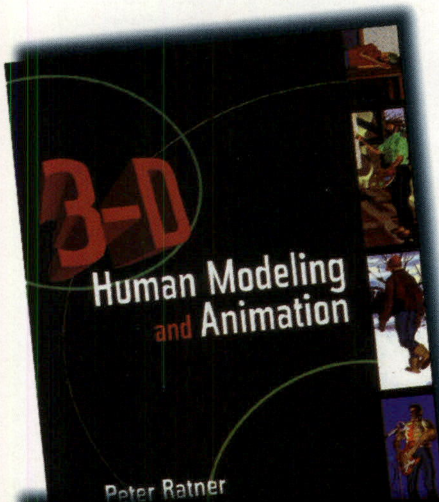
An intriguing look at Greg Lynn's approach to architectural design which is based on the concepts of motion and dynamics as applied to usually static and inert objects, ie buildings. Lynn explains his approach in this book in the brief introduction and through a number of case studies over 128 pages. There's not a lot of narrative, with most of the text forming captions.

Lynn explains the use of simulated forces on particle systems and other 3D objects to create a surface envelope that defines the shape of the buildings' structures. He also uses Metaball-like objects to create surfaces for some of the installations. Pictures show the rendered form taking shape as it reacts to forces, and also real models of the final structure created using Stereo Lithography while rendered movies can be found on the accompanying CD.

The most stunning design is for the New York Port Authority Bus Terminal. Constructed using particle systems and forces to define tubular steel arches which in turn support tensile fabric bands, resulting in a complex object that is both beautiful and functional.

This book shows that a different approach can produce new and spectacular results. Well worth a look.

"A fascinating look at an alternative use of 3D"



3D Human Modelling and Animation

Peter Ratner ▸ John Wiley & Sons ▸ £30.50 ▸ ISBN: 0-471-29229-X

With the advent of apps such as *Poser*, creating 3D human figures has been greatly automated. In this detailed course you're shown how the human form can be constructed from scratch with splines and NURBS, to produce a believable model that will animate with realism.

Profusely illustrated, each element of the figure is covered in detail. Not intended to be program specific, users of *LightWave 3D* though, will find that many of the techniques, and much of the advice, is relevant to their software.

Beginning with a discussion of the creation of modelling primitives, the supporting tutorials on spline and NURB construction are concise and lead to more detailed information on the use of texture mapping. Concluding with two chapters on preparing your figure for animation, and how the human figure behaves when in motion, this book is thorough, comprehensive, and flexible.

Overall, this is an excellent guide to creating the human form with your favourite 3D modelling package; especially when you need more control over the modelling structure as detailed advice is given on Metaball, polygonal, lattice deformations, as well as seamless spline based modelling.

"Model convincing human figures with this guide"

A Bug's Life: The Art and Making of an Epic of Miniature Proportions

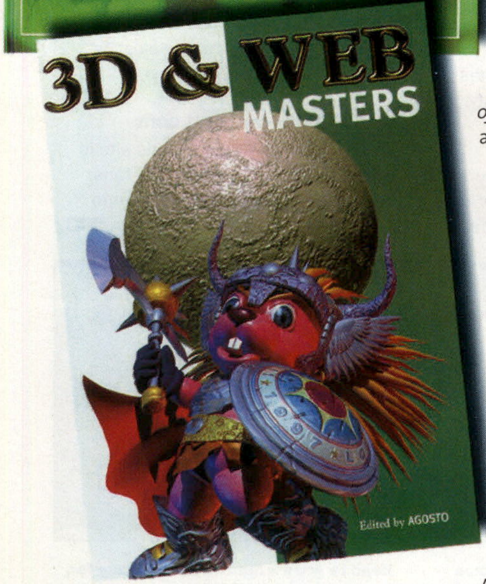
Jeff Kurtti ▸ Hyperion ▸ £27.50 ▸ ISBN: 0-7868-6441-9

This sumptuous large format book tells the development story of the of Pixar's latest project under the guidance of computer animation guru John Lasseter, who has taken CGI effects and propelled them into the mainstream. Jeff Kurtti author of *The Art of The Little Mermaid*, and *The Art of Mulan* has written a detailed account of the making of this ground breaking motion picture.

Kurtti has, however, not produced a technical explanation of the animation process. In fact you will not find a single piece of hardware, or software mentioned in the book. He instead focuses on the story and character development that went into the creation of this film, splitting the book into four sections beginning with the origins of the Bug's idea, and concluding with an analysis of what the film means to the Pixar technicians.

A wonderful book to look at and handle, and one that offers a showcase for some outstanding computer modelling, characterisation, and story telling yet captured on film.

"A glorious showcase of the state-of-the-art in computer art..."



3D & Web Masters

Ed. Agosto ▸ Rockport Publishers ▸ £25.00 ▸ ISBN: 1-56496-548-1

Split into two sections, this showcase of digital art is sumptuous to look at, but offers very little more for the casual viewer. The book begins with a selection of images from some of the world's top digital artists, with each image labelled with details of the software that was used to create it.

Also in this first section are step-by-step visual tutorials that attempt to show how some of the elements of selected images were produced. These are inadequate for the casual viewer to make sense of, let alone learn from. These pages would have been better used with more images.

In the second section the work of digital artists in multimedia and on the Net are detailed. Again, each site is shown in glorious full colour, but as the vast majority are multimedia sites and therefore by definition have an interactive element to them, displaying them in this way is a waste. Lacking is an accompanying CD that should have shown these sites in all their glory.

This is little more than a condensed portfolio of images from a selection of artists. Marvel at the inspiring images that are presented here, but don't expect any insight into how these eye-popping designs were produced.

"Get inspired by the work of these digital artists"

Web Resources

THE WORLD WIDE WEB HAS A PLETHORA OF RESOURCES – HIT ALL THESE DIRECT FROM OUR CD INTERFACE...

Whether you're a beginner who wants to test the waters with a demo, a seasoned designer looking for inspiration, or even if you're just after some freebies, it's time to let your fingers do the walking...

There are literally hundreds – and probably thousands – of Websites that are stuffed full of useful tips, tutorials, free wireframes, plug-ins and textures on the Internet, just waiting for you to click 'download'. This can be a real gift if the tool is the kind of thing you'll probably only use once or twice. Many of the downloads are free, and others (particularly models and textures) will ask you to contact the manufacturer if you want to use them for commercial work. Also, most of the sites listed have a wealth of links to other handy places, because resources on the Web stretch into infinity and beyond...

www.ktx.com

The Kinetix site offers mounds of information on *3D Studio MAX*. The list of free plug-ins consists of links to the various sites where they can be found too, so a whole world of useful hits is opened up for you in an instant.

www.3drender.com

3drender.com offers 'make this image' type tutorials, plus career advice – including how to learn 3D, tips on creating the perfect portfolio and employers. The 'discussion group' is also a great way to get feedback and advice, and pick up more links...

www.povray.org

The Persistence of Vision (*POV-Ray*) package is a freeware raytracer, and this is its site. Everything you need to know to get and use *POV-Ray*.

www.flay.com

This site is devoted to *LightWave 3D*, offering news, galleries and the usual. However, this site is pure quality, and the searchable 'techniques database' and plug-in stores (with over 230 freebies) make it indispensable.

www.raph.com/3dartists

Offers a comprehensive set of links to tutorials on the Web. They're sorted into the software categories for your convenience. Includes *Ray Dream*, *3D Studio MAX* and *LightWave 3D*.

www.3d-design.com

This is a well-designed site which offers free plug-ins, tutorials and textures. The seamless texture tiles are arranged in packs of six for you to view easily and download free, too.

www.webreference.com/3d

If you need a tutorial on something, chances are you'll find it here. When we went to press, it was showing a workshop on 3D character animation – but you can always browse the huge backlog of lessons. Also has a well-written glossary of 3D terms.

www.3dark.com

More links than you can shake a stick at. For freebies, resources, news and tips, all with a short review about what they do and how good they are at it.

perso.pacwan.fr/delcuze

A labour of love about the proclaimed: "best 3D package for the PC" – *Rhino*. Offers tutorials, plus an index of commands and resources – you'll find more of that in our 200 Tips on p12.

www.pixels3d.com

The home page of *Pixels Studio* offers news, information and free demos of its software. You'll also find *Pixels 3D 2.1.4* currently available for free download at this site.

users.visi.net/~nghtcrft/home/3dmax/

Although not the prettiest site in the world, this space has lots of freeware plug-ins, textures and meshes.

www.cinema4d.com

HiSoft's official *Cinema 4D* page has product reviews and demos a-plenty. Why not take a trip?

www.gomark.com

Gomark distributes *form•Z*, *Amapi* and *Infini-D*, which you've probably already tried from our CD. Gomark's homepage offers plenty of information, examples, and some demos too.

www.3dcafe.com

3Dcafe bills itself as the 'ultimate on-line resource for 3D', and it's pretty hard to argue... Free textures, meshes and demos nestle in the good-looking site, alongside the excellent '3D Community' section, which offers inspiration and the opportunity to contact other 3D artists.

www.viewpoint.com

The model bank has over 5000 models, and if you become a member you can get 20-80% discount on them. Better than a slap on the back with a wet kipper, we're sure you'll agree.

www.caligari.com

Caligari is the company behind *trueSpace*, and its home page is the place for demos, news and information on the package. In case you somehow missed it, a full version of *trueSpace 2* is on the CD (plus a demo of v4), and an upgrade offer lies within our Interactive section, starting on p93.

www.blender.nl

Blender is a complete modelling, rendering and animation tool, and is available for free download. This site also has links to sites for free textures.

www.phoenixtools.com

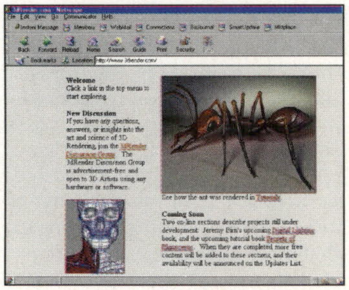
Softimage-focused site with tutorials and plug-ins. Beware, though – you have to shell out for the first lot, but there are some free in a separate list.

www.blackfeet.com

Well-designed site offering plug-ins at discounted prices. Wahey!

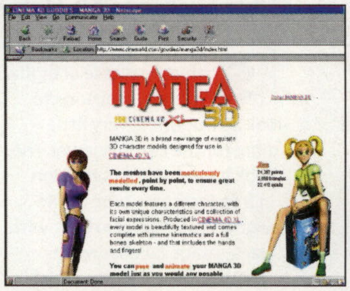
www.lightwaveworld.com

As the address suggests, this site is a treasure-trove for *LightWave* fans. The plug-ins are handily sorted into commercial, demo and freeware.

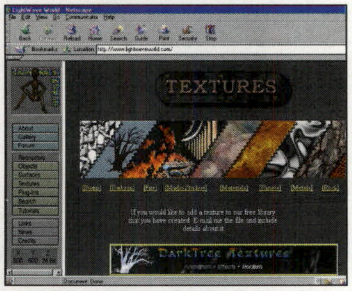


Check out the tutorials featured at w www.3drender.com for in-depth instruction. The pics are pure quality.

You'll find over 100 textures for free download at w www.3d-design.com – and there are new items added every week.



The *Cinema 4D* official site is the place to pick up the latest product news, such as these new poseable Manga models.



Head to w www.lightwaveworld.com for, you guessed it, *LightWave* heaven. Info, free plug-ins and pretty pictures.

cas02

interactive

Full software, upgrades, demos, movies, walkthroughs & resources

CD Index

Time-limited full software

Dual

- Amapi 4 **(60-days)**

PC only (PCsoft\Full)

- Cinema 4D GO **(90-days)**
- trueSpace 2 **(no limit!)**

Mac only (Macsoft\Full)

- Strata Vision3D 4 **(no limit!)**

Demos

Dual (PCsoft\Demos or Macsoft\Demos)

- Adobe Photoshop 5
- Art•lantis 3
- Bryce 3D
- Cinema 4D XL
- CyberMesh
- effect*
- form•Z 3
- Infini-D 4
- Strata StudioPro 2.5.2
- paint*
- Painter 3D
- Ray Dream Studio 5

PC only demos (PCsoft\Demos)

- LifeForms 3
- Rhino
- trueSpace 4

Mac only demos (Macsoft\Demos)

- Cinema 4D GO
- Vertigo 3D Dizzy 1.0.4

Resources

Dual (PCsoft\Resources or Macsoft\Resources)

- Acrobat Reader 3
- QuickTime

Movies

Quicktime Format (CD root)

- Bugged – biGco – Bugged.mov
- The Spare Pin – Russell Appleford – SparePin.mov
- Stormfront – Benjamin Smith – StormFro.mov
- Planetary Traveller – Third Planet Entertainment Inc – Traveler.mov

Tutorial files

Amapi 4 (Dual\Amapi 4 Tutorial)

- A complete tutorial in this powerful 3D modelling and rendering package, in HTML format.

Exposure

Digital artwork (Dual\Exposure)

- JPEG format files of the terrific images featured.

Extras

Sample Viewpoint DataLabs DXF models (Dual\Viewpoint DXF Models)

- Ten high quality DXF models from the Viewpoint collections – which can be opened in almost all 3D packages. See each model, and an outline of what else Viewpoint has to offer on page 82.

CD-ROM basics

Your quick guide to getting started and getting the best from this *Computer Arts 3D Special* CD

1 How do I start the CD?

The CD should auto-run when you insert it into your computer's CD drive. If not, run either:

- CAiSpecMac for Mac users.
- CAiSpecWin32.exe for Windows 95, NT or 98 users.

To toggle auto-run on and off, use the appropriate Control Panel on your computer.

2 Is there any Windows 3.1 software on the CD?

No. We no longer support Windows 3.1 on the PC, or indeed 68K on the Macintosh. This is due to the high demands placed on computers by today's interactive multimedia. The *Computer Arts* CD interface will run under a Mac PPC or G3, and Windows 95 or higher.

3 Do I need any specific software to run the CD?

You'll need Apple's QuickTime digital video software in order to make full use of the CD interface. It's on the CD, and you'll be prompted to install it if you haven't got it.

If you're using a Mac, then the CD interface will work fine with any version of QuickTime installed. If, however, you're using Windows and have QuickTime 3.X installed, the interface may claim that QuickTime is not installed on your computer.

If this happens, please install version 2.1.2 of QuickTime (which you'll find in Resources on the CD), in addition to QuickTime 3.X. This will not erase your installation of QuickTime 3.X and will solve the problems.

You also need Web browser software and an active Web connection to make use of the Web-linked features of the CD. Please ensure you're using one of the following browsers to make use of this functionality:

- *Microsoft Internet Explorer 3* or higher.
- *Netscape Navigator 3* or higher (from **w** www.netscape.com).

Please ensure you're connected to your ISP before starting the CD if you intend to use the Web-linked features.

4 What if I need further assistance with the CD?

Contact our Technical Support department via the following means, in this order:

- **e** support@futurenet.co.uk
- **w** www.futurenet.com/support
- **f** 01225 732 279
- **t** 01225 442 244 (lines can be very busy)

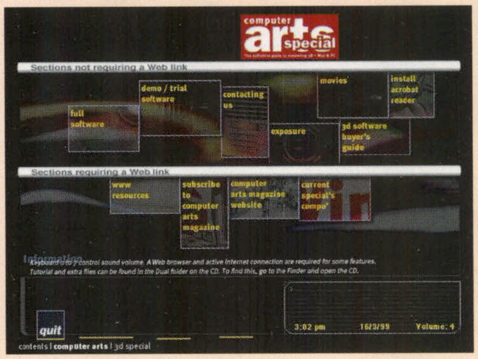
Visit **w** www.futurenet.com/support and you'll be able to check out a list of the most frequently asked questions about the *Computer Arts* CD. This Website is kept up-to-date with all the latest info, and has links for the downloading of any patches where applicable and available.

5 What if I have a faulty CD?

This is rare – but if confirmed by Technical Support, please return your CD to the following address and a free replacement will arrive within 28 days:
Disctronics, Southwater Business Park,
Worthing Road, Southwater, West
Sussex, RH13 7YT.

⇨

Featured software


computer arts special
Sections not requiring a Web link
full software
demo / trial software
contacting us
exposure
movies
3d software buyer's guide
install acrobat reader
Sections requiring a Web link
www resources
subscribe to computer arts magazine
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current special's compo'
Information
quit
3:02 pm
16/3/99
Volume: 4
contents | computer arts | 3d special

Keyboard 0 to 7 control sound volume. A Web browser and active Internet connection are required for some features.
Tutorial and extra files can be found in the Dual folder on the CD. To find this, go to the Finder and open the CD.

THE *COMPUTER ARTS 3D SPECIAL* CD IS PACKED TO THE GILLS WITH FULL SOFTWARE, TIME-RESTRICTED SOFTWARE AND DEMOS – GET A LOAD OF THIS NOT-SO-LITTLE LOT...

Full software

trueSpace 2 (PC only)

Upgrade: See page 97
Caligari
t 001 650 390 9600
w www.caligari.com

What's the serial number then?

3200030045101

PC system requirements:
Min: *P120 ▸ Win 95/98/NT ▸ 32RAM.*

Strata Vision3D 4 (Mac only)

Upgrade: See page 96
Principal Distribution
t 01756 704 000
w www.strata.com

What's the serial number then?

DD16244883471

Mac system requirements:
Min: *68K ▸ FPU ▸ 8RAM ▸ Sys 6.0.7.*

Time-limited full software

Amapi 4 – 60-day (dual)

Upgrade: See page 96
Gomark
t 0171 731 7930
w www.tgs.com

What's the serial number then?

2cbee1f9ce9a36cf3

PC system requirements:
Min: *P120 ▸ Win 95/98/NT4.0 ▸ 16/24RAM (95/NT).*
Mac system requirements:
Min: *PPC ▸ Sys7.5 ▸ 16RAM.*

Cinema 4D GO – 90-day (PC only)

Upgrade: See page 51
HiSoft
t 0500 223 660
w www.cinema4d.com

PC system requirements:
Min: *P100 ▸ Win 95/98/NT4.0 ▸ 32RAM.*

Demo software

Photoshop 5 (dual)

Full product: £490
Adobe
t 0181 606 4000
w www.adobe.co.uk

PC system requirements:
Min: *486 ▸ 16RAM ▸ Win 95.*
Mac system requirements:
Min: *PPC ▸ Sys 7.5 ▸ 32RAM.*

Art•lantis 3.0 (dual)

Full product: £430
Gomark
t 0171 731 7930
w www.gomark.com

PC system requirements:
Min: *P90 ▸ 20RAM ▸ Win 95/NT.*
Mac system requirements:
Min: *PPC ▸ 20RAM.*

Bryce 3D (dual)

Full product: £210
Computers Unlimited
t 0181 358 5857
w www.metacreations.com

PC system requirements:
Min: *P90 ▸ 16RAM ▸ Win 95.*
Mac system requirements:
Min: *PPC ▸ 16RAM ▸ Sys 7.1.*

Cinema 4D XL (dual)

Full product: £1095
HiSoft
t 0500 223 660
w www.cinema4d.com

PC system requirements:
Min: *P120 ▸ 16RAM ▸ Win 95.*
Mac system requirements:
Min: *PPC ▸ 24RAM ▸ Sys 7.5.*

CyberMesh (dual)

Full product: £41
BIT UK
t 01420 83811
w www.puffindesigns.com

System requirements:
Adobe Photoshop and a system capable of running it.

paint* 2.0 (dual)

Full product: £1639
BIT UK
t 01420 83811
w www.discreet.com

PC system requirements:
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Mac system requirements:
Min: *PPC ▸ 64RAM ▸ Sys 7.5.*

effect* 2.0 (dual)

Full product: £1639
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form•Z 3 (dual)

Full product: £2100
Gomark
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w www.AutoDesSys.com

PC system requirements:
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Min: *PPC ▸ Sys 7.1.2 ▸ 10RAM.*

Infini-D 4 (dual)

Full product: £703
Computers Unlimited
t 0181 358 5857
w www.metacreations.com

PC system requirements:
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Mac system requirements:
Min: *PPC ▸ 32RAM ▸ Sys 7.0.*

Strata StudioPro 2.5.2 (dual)

Full product: £1103
Principal Distribution
t 01756 704 000
w www.strata.com

PC system requirements:
Min: *P133 ▸ Win NT/98 ▸ 32RAM.*
Mac system requirements:
Min: *PPC ▸ 64RAM ▸ Sys 7.6.1.*

Painter 3D (dual)

Full product: £351
Computers Unlimited
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w www.metacreations.com

PC system requirements:
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Mac system requirements:
Min: *PPC ▸ 16RAM ▸ Sys 7.x.*

Ray Dream Studio 5 (dual)

Full product: £375
Computers Unlimited
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w www.metacreations.com

PC system requirements:
Min: *P90 ▸ Win 95/NT ▸ 16/24RAM.*
Mac system requirements:
Min: *PPC ▸ 16RAM ▸ Sys 7.x.*

LifeForms 3 (PC only)

Full product: £278

BIT UK
t 01420 83811
w www.credo-interactive.com

***note:** you need QuickTime 3 installed to run this demo.

PC system requirements:
Min: P90 ▸ Win 95/NT ▸ 16/32RAM.

Rhino (PC only)

Full product: £582
Aztec CAD
t 0171 987 6543
w www.azteccad.co.uk

PC system requirements:
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trueSpace 4 (PC only)

Full product: $595
Caligari
t 001 650 390 9600
w www.caligari.com

PC system requirements:
Min: P120 ▸ Win 95/98/NT ▸ 32RAM.

Cinema 4D GO (Mac only)

Full product: £169
HiSoft
t 0500 223 660
w www.cinema4d.com

Mac system requirements:
Min: *PPC ▸ 32RAM ▸ Sys 7.1.2.*

Onyx Tree Pro 4 (Mac only)

Full product: £441
BIT UK
t 01420 83811
w www.onyxtree.com

Mac system requirements:
Min: *PPC ▸ 4RAM ▸ Sys 7.1.*

Vertigo 3D Dizzy 1.0.4 (Mac only)

Full product: £69
Principal Distribution
t 01756 704 000
w www.vertigo.com

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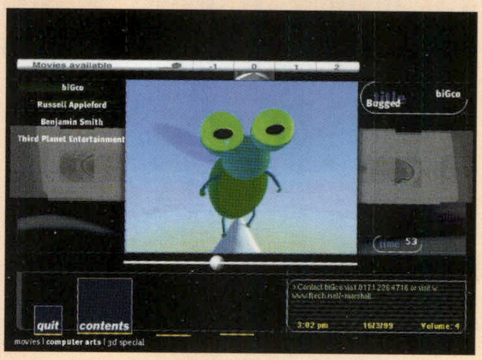

> Contact biGco via t 0171 226 4716 or visit w www.ftech.net/~marshall

DRAW INSPIRATION FROM THESE FOUR FANTASTIC EXAMPLES OF 3D ANIMATION...

Bugged – biGco

CD root\Bugged.mov
This is a great short animation from biGco who we profiled in *Computer Arts* issue 19. Contact them on **t** 0171 226 4716 or visit **w** www.ftech.net/~marshall

The Spare Pin – Russell Appleford

CD root\SparePin.mov
Russell created this terrific movie for a Time Based Media as part of his Visual Communications degree at the University of Central England. It was shown on the BBC with his award-winning *Bump 'n' Andy* movie. Contact Russell **e** russell-a@moving-picture.co.uk

Stormfront – Benjamin Smith

CD root\StormFro.mov
Benjamin created this project as a trailer for a fictitious science-fiction movie. It was the winner of Best Visual Effects Award at the Computer Animation 97 festival in Geneva. Ben now has his own company called Stormfront Digital Pictures, and you can contact him on **t** 0114 274 7447.

Planetary Traveller Trailer – Third Planet Entertainment Inc.

CD root\Traveler.mov
This movie may look like it was created in *Bryce 3D* but it wasn't! It was made with a custom version of *Bryce 2* which had been modified to incorporate the animation effects used so effectively in it. The movie was a collaborative venture between: L'Ongnion, Rob Sonner, Susan Kitchens, Bill Ellsworth, Cathy Faye Rudolph, Dieter Erik von Schramm and Desi Starr. For more details on this movie, please visit **w** www.thirdplanet-inc.com or **e** info@thirdplanet-inc.com

⇨

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Strata Vision3D 4 (Mac only)

Fully working software

What's the serial number then?

DD16244883471

Mac system requirements:
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Upgrade offer to v5

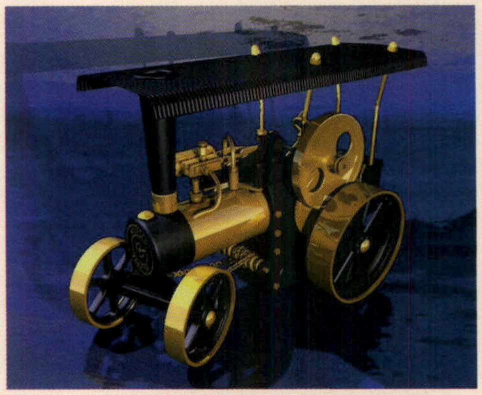
Upgrade to version 5: £99.95
Call Victoria at Principal Distribution
t 01756 704 444

As a *Computer Arts* reader, you can upgrade to version 5.0 of *Strata Vision3D* at the discount price of £99. To do this you should contact Victoria at the upgrades department at Principal Distribution on t 01756 704 444. This offer is only available to UK readers and expires on the 31st May 1999. The benefits of upgrading mean that you can enjoy: QuickDraw 3D support, Radiosity rendering (for more realism), and The Path Extrude tool.

The Cinema 4D family

Hi-Soft
t 0151 718 181
Full upgrade details on p51

Cinema 4D is a powerful 3D modelling and rendering application which comes in three flavours. *Cinema 4D GO* is the baby of the family – but don't think it isn't powerful. Next up is *Cinema 4D SE5*, which boasts more power, but at increased cost. Then there is the mother of the family, *Cinema 4D XL*. This is a real heavyweight with plenty of tools and functions to keep you busy. All three have one thing in common, though – and that is the extremely fast and efficient rendering engine. Check out the trial version of *GO* and the demo of *XL* on the CD.



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trueSpace inspiration

To illustrate what's possible with your free copy of *trueSpace*, we've showcased the work of user Tom Marlin…

Marlin Studios of Arlington, Texas, is a graphics studio founded in 1993 by President Tom Marlin. The studio specialises in: graphics publishing, distribution and sales; graphics software development; and high-end graphics art and animation.

Tom is a long-time fan of *trueSpace*, and has used it throughout his career. Among other things, he used *trueSpace* to create the game, *Rings of the Magi*, which was the 10th best shareware game of all time. Tom has access to programs that cost thousands of dollars more than *trueSpace*, but he finds himself returning to it for much of his work.

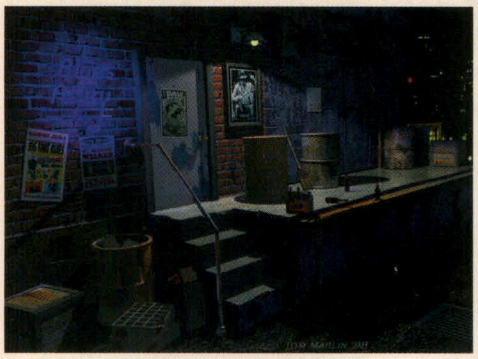
"*trueSpace's* interface is so intuitive, I feel like I'm working with a paintbrush. I can't find any other program that gives me the same artistic freedom as *trueSpace*," says Tom. "My *Seamless Textures* CD and *trueSpace4* is a perfect match for creating stunning 3D graphics. *trueSpace* is the most intuitive and artistically-inspiring 3D tool on the market."

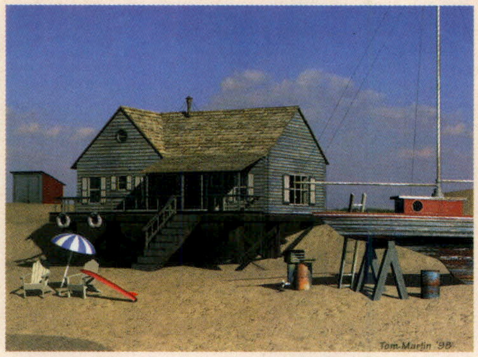
Tom has worked in the computer industry since the 1970s in a number of management, marketing and technical positions. He's an accomplished publisher, producer, writer, game/Web designer, photographer and 3D artist/animator, with several successful commercial texture collections and game titles to his credit. Tom also authored a novel, contributes to various books and magazine articles on computer graphics, and is an honourary lifetime member and original steering committee member of the International Game Developers Network.

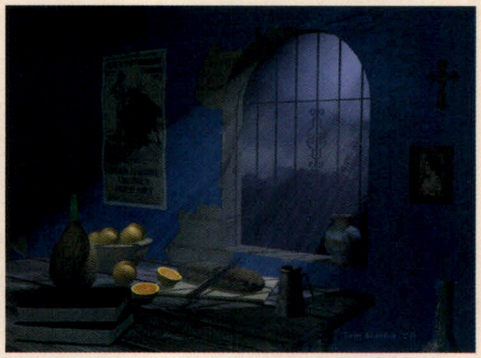
Here are a couple of examples Tom's work using *trueSpace*. You've got the full version of *trueSpace 2*, plus a magazine full of techniques and tips, so why not draw inspiration from Tom's work, and check out the upgrade offers below?

Information

To see more of Tom's work, drop into **w** *www.marlinstudios.com*







trueSpace upgrade: save up to £75

Save up to £75 when you upgrade to *trueSpace 3* or 4 with *Computer Arts Specials* and…
This is a limited upgrade offer for *Computer Arts Specials* readers…
Upgrade from *trueSpace 2* to *3*: £195+VAT = £229 including VAT
Upgrade from *trueSpace 2* to 4: £355+VAT = £417 including VAT

Caligari's *trueSpace 3* adds significantly to v2 by including such features as Metaballs, Collision Detection, Physics, Inverse Kinematics and more.

If you thought creating and animating 3D objects was easy and intuitive in *trueSpace 2*, just wait until you get your hands on v3! Plus, it comes with Caligari's unconditional guarantee: if it doesn't revolutionise the way you work with 3D graphics, return it within 30 days for a full refund.

You can have all of this and more if you upgrade to *trueSpace 3* today. It'll cost you only £195 (£229 including VAT), and this is a superb special offer for *Computer Arts Specials* readers.

trueSpace 4

Now that you've discovered the power of *trueSpace 2*, how would you like more power and capabilities? We have a special offer just for you…

trueSpace 4, the latest in Caligari's flagship line of *trueSpace* products, has just been released – and it can be yours for the special price of just £417.

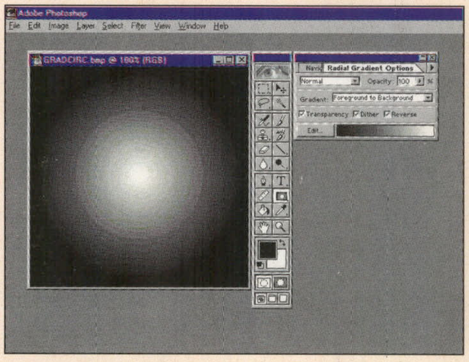
trueSpace 4 has all the new features introduced in *trueSpace 3*, plus new high-end ones such as Bones, Nurbs, Function Curves and Scripting. A new hybrid radiosity renderer also enables you to create the ultimate in realism.

If creating 3D in *trueSpace 2* was a breeze, Caligari promises the capabilities of *trueSpace 4* will blow you away. Plus, it comes with Caligari's unconditional guarantee: if it doesn't revolutionise the way you work with 3D graphics, you can return it within 30 days for a full refund. You can have all this power for only £355 (£417 inc VAT).

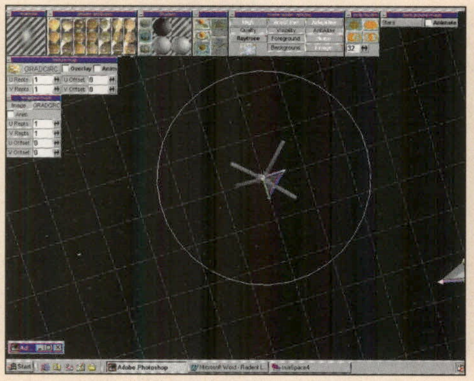
trueSpace 3 or 4 upgrade offer: Caligari on t 0118 982 9826 or f 0118 982 9827

trueSpace tutorial: How to create radiant objects

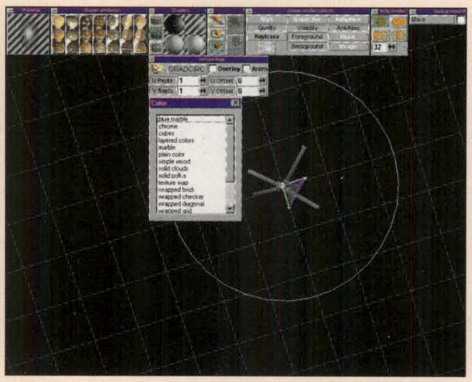
Many budget packages lack the ability to have luminous objects, but you can still simulate radiant light sources. Early versions of *trueSpace* can produce something which renders quickly and doesn't require raytracing...


Adobe Photoshop
File Edit Image Layer Select Filter View Window Help
GRADCIRC.bmp @ 100% (RGB)
Radial Gradient Options
Normal
Opacity: 100 %
Gradient: Foreground to Background
Transparency Dither Reverse
Edit...

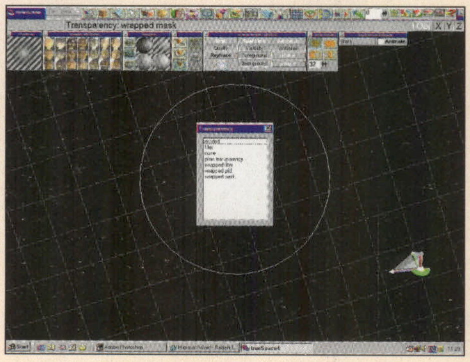
1 First, we need to make the alpha channel mask. Virtually any 2D paint package will do, as long as you can produce a circular gradient from black to white. Radial Gradient fill does this in *Photoshop* in a single operation. Make the mask a reasonable size, depending on your intended final image.



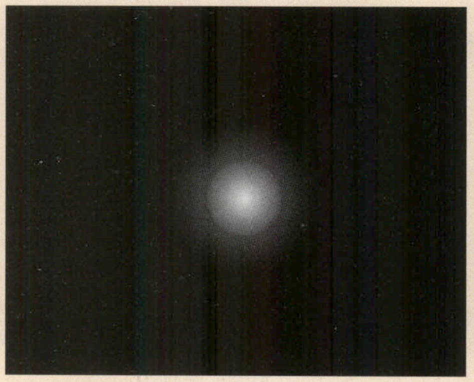
2 To start, make the shape you ultimately want to work with: this doesn't specifically need be a disc, but that's what we picked for this example. A disc with 32 sides – if you want a smoother effect you can go for more sides.



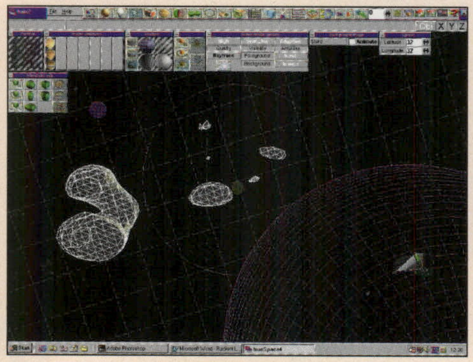
3 To apply the texture, you need to right-click on the colour part of the Shaders panel and select Texture Map. From here, you can select your alpha channel mask. It isn't ready for use because it's still an opaque polygon – we need it to be partially transparent.



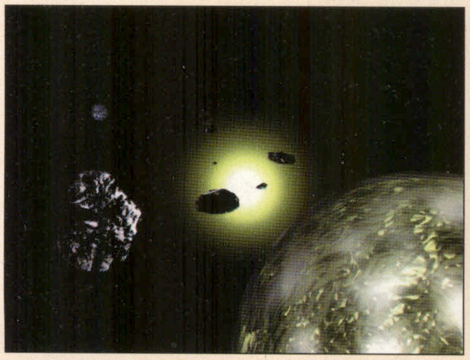
4 To make the polygon transparent, we need to right-click on the Transparency part of the shaders, and select 'Wrapped Mask'. The image we want to set is exactly the same as the texture, our mask. Make sure both have the same number of UV repeats, or very strange things will happen.



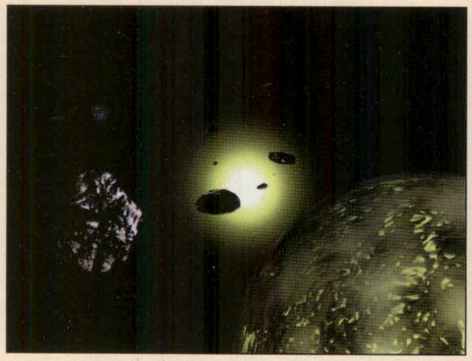
5 A test render with a star field as a background. To get the best effects you need to set Quality to High and use 2x super sampling for anti-aliasing; adaptive will cause a halo to appear at the edge of the map. This only needs a bit more to look very impressive.



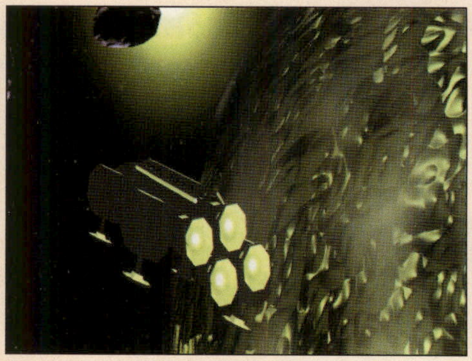
6 To add to the 'space' look, we added some asteroids and a planet. The asteroids were made from metaballs with the resolution increased to 50. These were then covered with a nice moon bump map. The 'planet' is merely two spheres, the outer one being a transparent cloud layer.



7 Here's the finished space image, and it took just two minutes to render on a PII 300. The scanline rendering looks raytraced. The local light blasting the disc at short range has created a 'corona' effect by accident. We tried adding Lens Flare effects, but it didn't create any great shakes.



8 For comparison, here's the same scene raytraced. There's virtually no improvement, and it took five times longer to render. The only real differences are in the size of the corona, and the planet does look cleaner raytraced. All we need now are some spaceships.



9 There are many uses for these artificial luminous objects. Here, the same disc is used to create the engine glow inside a spaceship exhaust. You must remember to set shadows on for the local light inside the engines, or the whole back of the ship becomes bathed in light. ca>s

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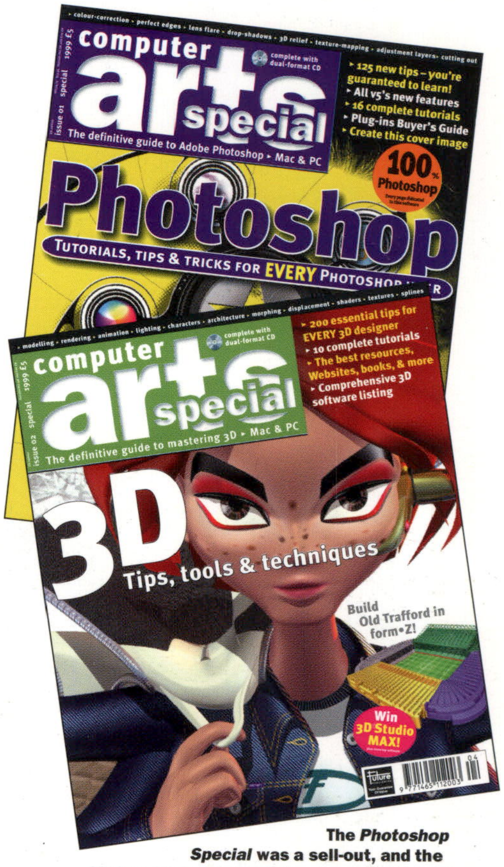
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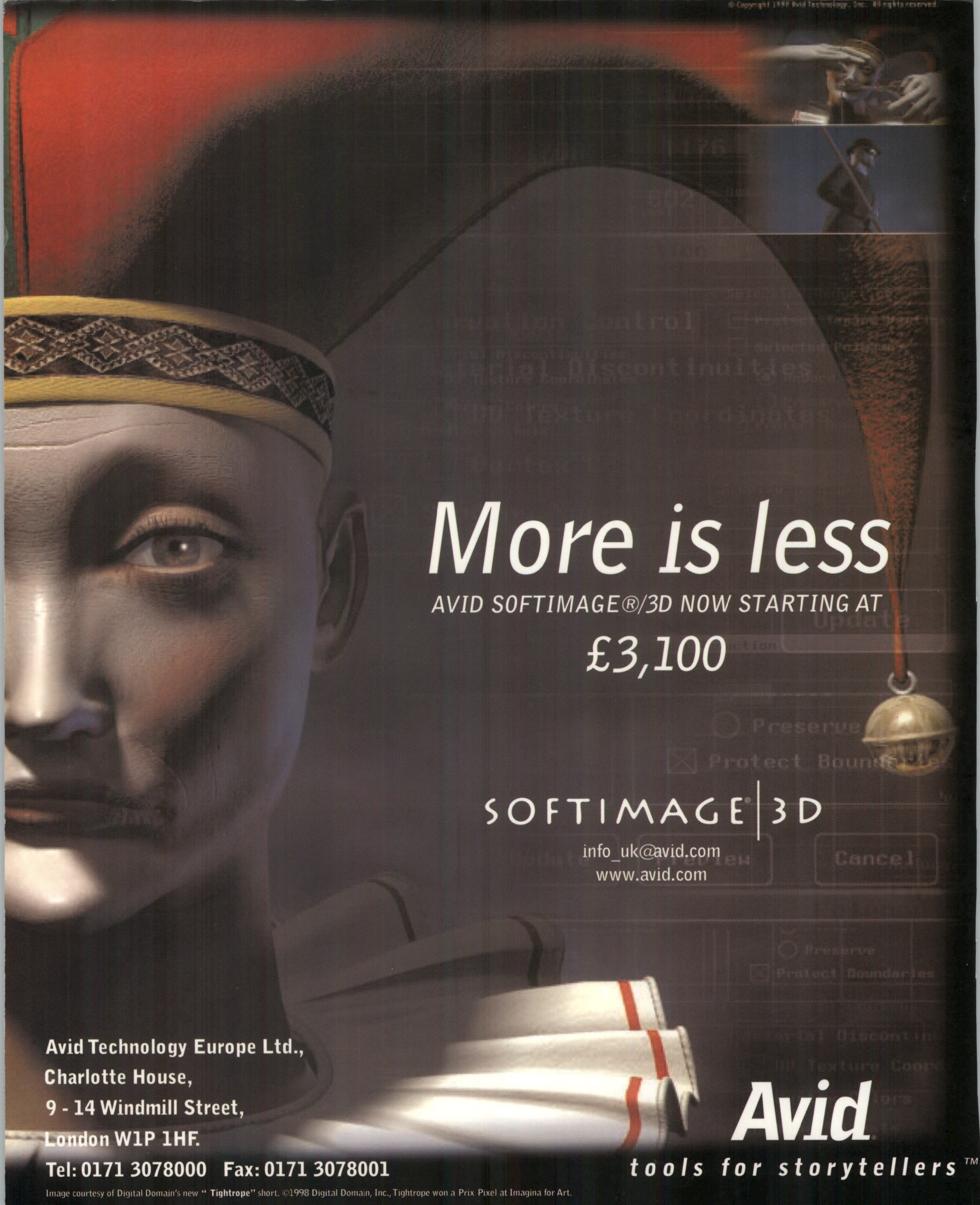

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